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Subterranea

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In This Issue

The Stockport PR1 repeater station

Sub - Brit Regional Groups

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Books, News and Reviews

The Newsletter of Subterranea Britannica and The Cold War Research Study Group.
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Subterranea Britannica is a society devoted to the study of man-made and man-used, underground structures and the archaeology of the Cold War. The main focus of interest is on abandoned and forgotten structures and, in the case of Cold War structures, studies are entirely confined to declassified and decommissioned structures.
The society is open to all and its membership includes all walks of life. Members are invited to contribute to this newsletter even if this just means sending very welcome snippets from newspapers and magazines.

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News

Norway to keep nuclear bunkers?

Norway's Security Agency has recommended that the country's 20,000 Cold War nuclear shelters should be retained for use in case of possible terrorist attacks. The Norwegian Government had considered allowing the bunkers, which could house half the population, to be converted for other uses.

Source: Anon, 2004, Norway urged to keep shelters. *The Guardian*, 20 November 2004, page 2.

Cave houses in Andalusia (Spain)

There is a complex of 80 underground houses excavated into limestoen some 70 years ago at the village of Carramaiza, some 40 miles from Granada. One of these, modernised, is featured in a recent issue of *Daily Telegraph Property,* and at www.visionremota.org/cuevas . For details of cave holiday cottages, see www.altipla.com/jj/eng/cmaiza-principal.htm

Source: Oliver Bennett, 2004, Spain - Adalusia. *Daily Telegraph Property*, 20 November 2004, page 3.

Development of mining industries in Greenland

Greenland is rich in mineral resources, although until recently these have been little investigated as they tend to be in remarkably isolated locations and very difficult of access even in favourable weather and hours of daylight. Graphite was mined in the 19th century, and with the rise of aluminium smelting in the 20th century (not in Greenland however) an international demand for cryolite has been met from a mine operated at Ivittuut. A gold mine started production at Nanortalik (Nalunaq) in 2004; and work is now in progress with a view to underground mining in the Skaergaard igneous complex; where there are reserves of cobalt, copper, diamonds, iron, lead, magnetite, nickel, niobium, olivine, palladium, platinum, tantalum, titanium, uranium, and zinc. Gas and oil may also prove to be present in commercially useful quantities onshore or offshore. Greenland, currently technically a part of Denmark, sees the possibility of prosperity based on mineral wealth making independence realisable.

Source: MOONEY, Brian, 2004, Drilling for independence. *Geographical Magazine*, 76(12), (December 2004}, 49 - 51, 53 and 56.

And now, even MORE chalk mines at Reading!

Just as the proposed more extended programme of site investigations in the Field Road area of Reading are running into problems with financing, even more mines have come to light at a site on Tilehurst Road, about 300 metres south of Reading West Station. These are, at least in part, below a Listed Building, and property proposed for new housing development. The likelihood is that the newly discovered cavities will be filled with concrete, without any opportunity for archaeological recording.

Sources: Aisha Iqbal, 2004, Don't panic: developer tells families. Mines yards from homes. *Reading Evening Post*, 9 November 2004; Karl Plunkett, 2004, Million pound survey hitch. Long awaited chalk mine probe delayed and yet more old shafts found. *Reading Chronicle*, 11 November 2004.

Two more very long Alpine rail tunnels are planned

Two more very long tunnels linking Italy with both Austria and France are at the planning stage. A 'Brenner base tunnel' is proposed to be open by 2015, and would be 56 kilometres long, providing a short cut between Innsbrück and Fortezza. The present rail link, alongside the main road, crosses the border here in the Brenner Pass and, on the Italian side, includes a long loop tunnel to allow the line to lose height. A new link from the France to Italy, also proposed, is a 52 kilometre tunnel on the line from Lyon to Turin.

Source: GOUGH, John, 2004, Austria: partners aim to have a Brenner base tunnel by 2015. *Modern Railways* 61(670), page 62 [Austria - Italy: 56 km tunnel proposed]; GOUGH, John, 2004, Green light for Alpine tunnel. *Modern Railways* 61(670), 62 - 63 [France - Italy: 52 km tunnel proposed on the Lyon - Turin line]

Keswick Mining Museum has moved

Local mining historians Ian and Jean Tyler are re-locating their mining museum collections from Threlkeld Quarry to a more prestigious site in the centre of Keswick, Cumbria, with effect from 14 September 2004.

The new address and contact details are:

Keswick Mining Museum, Otley House, Otley Road, KESWICK, Cumbria CA12 5LE

Telephone: 017687-80055 or 01228-561883
Email: coppermaid@aol.com

Ian and Jean Tyler founded the museum some 15 years ago and, as publishers Blue Rock, have written and published a total of nine books on Cumbrian mining. A tenth title is expected in Spring 2005.

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Private house and nuclear bunker at Dartmouth

A house with a good view over a fishing port, and with its two own nuclear bunkers, is on the market for £ 600,000. The owner, Mike Thomas, decided during the Cold War that his home, close to the Royal Naval College at Dartmouth, was at risk, so built himself the bunkers.

Source: ANON, 2004, Dream home has nuclear bunkers. *Metro*, 21 September 2004, page 5 [Private house / bunker built close to the Royal Naval College at Dartmouth.

Latest issue of British Mining: Keighley Coal

The Northern Mine Research Society's latest Monograph, *Keighley coal*, by Michael Gill based on the papers of the late Paul Davidson, has been published as a substantial booklet of 107 pages. It contains location maps and photographs for the Rough Holden, Morton Banks, Riddlesden, Park Wood, Long Lee, Oakworth, Haworth, Stanbury, Sawood, Denholm, Bradley, Reedshaw, and other collieries, photographs, geological information, somje details of personnel, etc., and is liberally provided with references to primary sources.

GILL, Michael C., and Paul DAVIDSON, 2004, Keighley coal (a history of coal mining in the Keighley district.) *British Mining* 74: 107pp [ISBN 0901450-7-X]

Formerly inhabited caves in Scotland

Dave Irwin has published a note on Scottish caves portrayed on picture post-cards, the most frequently encountered example being unsurprisingly Fingal's Cave on the Isle of Staffa. He has raised a query about two formerly inhabited caves. The Sheep Rink Cave, at Ardwell, nine miles south-east of Portpatrick, was once the home of one William Purvis. Two post-card views are known of this, dating from about 1905, shewing Purvis outside his cave. Grimm's Cave, at Muchalls, four miles north-east of Stonehaven, which is possibly that once inhabited by an Adam Middleton. Dave would like to hear from anybody who might be able to throw more light on these caves or their inhabitants: he is at Townsend Cottage, Priddy, Somerset BA5 3BP.

Source: Dave Irwin, 2004, Two inhabited caves in Scotland. *Bull. Grampian Speleological Group*, 4th Series, 2(2), 34 - 35.

Barytes mines in Galloway, south-west Scotland

Ivan Young, whom some members will recall as our guide at the West Lothian oil-shale mines on our recent Study Weekend, has published some notes on barytes mines in Galloway. He, with Jim Salvona and Peter Ireson, found a blocked adit at or near Barlocco, which had been worked in the 19th century but closed in the late 1800s, to reopen again in the years 1914 - 1920 and 1946 to 1954. There was another mine nearby at Airyhill Cottage, and a copper mine near Airds Farm. Ivan's report includes a location map, shewing the several mines along the shore of the Solway Firth, to the south of Auchencairn, and recommends a number of wen sites for further information: Auchencairn History Society .
http://www.auchencairn.org.uk/clubs/historysociety/historysociety.htm
Digital Historical Map Archive - http://www.old-maps.co.uk/
The Barytes Association - http://www.barytes.org
Mineralogy Database -
http://www.webmineral.com/data.Barite/shtml

Ivan, in a second article, also describes the sea caves at nearby Barlocco.

Source: Ivan YOUNG, 2004, More mine hunting in Galloway. *Bull. Grampian Speleological Group*, 4th Series, 2(2), page 36.

Source: Ivan YOUNG, 2004, The Black and White Caves of Barlocco. *Bull. Grampian Speleological Group*, 4th Series, 2(2), 15 - 18.

Prehistoric cave finds on Skye

Although most of the Isle of Skye is made up of Tertiary igneous rocks, there are also important outcrops of sediments of Cambro-Ordovician to Jurassic age, including a noteworthy belt of limestone, containing small caves, south of the road from Broadford to Torrin. The results of investigations into one of these caves have recently been reported, with a location map, plan, section, and photographs.

Source: Steven BIRCH, 2004, Uamh an Ard Achadh (High Pasture Cave): a window on the prehistory of Strath, Skye. *Bull. Grampian Speleological Group*, 4th Series, 2(2), 39 - 46.

Proposed caving trip to Staffa

Fraser Simpson, of the Grampian Speleological Group, has proposed an expedition by hired boat to survey the sea-caves of the sle of Staffa, of which the most famous is of course Fingal's Cave.

Source: SIMPSON, Fraser, 2004, Calling all GSG sailors. *Newsl. Grampian Speleological Group* 120, 6 - 7,

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New use for an old tunnel near Geneva (Switzerland)

What is described as a 27km ring tunnel under the Jura mountains near Geneva, on the France / Switzerland border, is being refubrnished and re-equipped by Organisation Européens pour la Recherche Nucléaire (CERN), its owners. Whether this is 27 km in radius, diameter, or circumference is not stated - presumably the last of these, implying a diameter of about 8.6 km.

CERN is removing the existing Large Electron Positron Collider (LEP) machine, and replacing it with a Large Hadron Collider (LHC.)

It is thought that this machine will probably yield evidence that the present theory of sub-atomic 'particles' and inter-particle forces is an inadequate explanation of how the universe works. Crucially, it fails to integrate gravitational force into the overall picture. Several alternative theories are already lined up, including one calling for more than the customary three (or four, including time) dimensions.

Source: Alok JHA, 2004, When particles collide. *The Guardian (Life supplement)*, 7 October 2004, pages 1 and 4 - 5.

New railway tunnel on the main line near the Belgium / Germany border

The main railway line from Brussels to Cologne is being upgraded for high speed trains. Work at the international frontier 3.203 km west of Aachen includes a new single-bore tunnel to be driven parallel with the existing Busch tunnel, and the removal of an existing railway flyover. Arrangements at the border have to accommodate German right-hand and Belgian left-hand running, as well as differences in the electrical supplies.

Source: *Modern Railways* 61(673), page 81.

The Earth's birthday party?

The Geological Society of London's History of Geology Group celebrated its 10th anniversary on 22 October 2004, with a conference on *Geofrauds, fakes and hoaxes*. This was advertised as, also, a belated celebration of the 6,000th birthday of the earth which, according to Archbishop James Ussher [1581 - 1656] in his *Annales veteris et novi testamenti* (1650 - 54) was created on 22 October 4004 BC. As there was no year zero, the actual 6,000th anniversary of course should, as acknowledged in the announcement of the meeting, have been celebrated on 22 October 1997!

Source: *Geoscientist* 14(10)(October 2004), page 24.

John the Baptist's supposed cave investigated in Israel

Archaeologists have been investigating a short cave near the home town of John the Baptist, said to have been used by him to baptise his followers. The cave had been obscured by foliage, and partially filled by mud. A carving on the cave wall was found in 1999, and a five-year excavation commenced. More carvings have been found, as well as potsherds and a foot-shaped indentation onto to which, it is thought, ritual oil would have flowed from a channel. Scholarly opinion is divided on the attribution to John. As archaeological excavation by its very nature destroys evidence, about one third of the cave has been left un-excavated, for study by future archaeologists, at a time when investigative techniques may have advanced.

Source: *Descent* 180, page 5 (2004)

Palaeolithic cave archaeology at Isfahan, Iran

Stone tools and bones, dated to the Old Stone Age, have been reported from a newly discovered cave at Isfahan, in Iran.

Source: *Descent* 180, page 6 (2004)

New tunnels for The Netherlands

The Netherlands (comprising North and South Holland (the flat bit around Rotterdam) and all the other Dutch provinces) has never been well-endowed with underground sites. The most spectacular are the numerous and sometimes extraordinarily spacious and extensive networks of underground limestone quarries around Maastricht in South Limburg. There were once active, deep coal mines too, in and around Heerlen. The only railway tunnel was for a small mineral line passing through the limestone quarries at St. Pietersberg (Maastricht), and at the same city there are also some tunnels in the fortifications. More recently, an immersed tube tunnel at Rotterdam has facilitated the crossing of the river.Now, however, the Netherlands is joining the European High-Speed Trains club, with a new direct line from Antwerp (Belgium) to Amsterdam. This is almost completed, and has five tunnels, at Dordtsche Kil, Oude Maas, Rotterdam Noordrand, Groene Hart, and Schiphol Airport.

Amsterdam is developing a partially sub-surface Metro system, the north-south line from Bulksiotermeerplein to Zuid / WTC incorporating surface railway, and cut-and-cover, bored, and immersed-tube tunnels.

Sources: *New Civil Engineer*, 11 March 2004, 24 - 25; 2 September 2004, 18 - 19.

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Hindhead A3 road tunnel (Surrey) to be longer than at first planned?

A section of the A3 at the Devil's Punchbowl, a notorious bottleneck which does nothing to enhance the natural beauty or wildlife interest of National Trust land (a statutory Site of Special Scientific Interest) near Hindhead, is to be closed and restored to heathland. It is being replaced by a new twin-bore road tunnel below the hill, intended at first to be a 1.7 km bored tunnel. Concern about the environmental impact at the southern portal, in Tyndall's wood, has led to proposals for the design length to be extended by 0.33km at this end, with obvious cost implications. The extension would be partly bored, and partly a 'built' tunnel on the surface.

Source: *New Civil Engineer*, 3 June 2004, page 5.

Inside-out rock art or 'cavern sculpture' proposed for the Canaries (Spain)

Plans are being made to create, as art, an enormous cuboid cavern with a perfectly flat unsupported ceiling and floor, and vertical walls, inside the mountain Tindaya on the island of Fuenteventura in the Canary Islands group. The cavern, 65 metres long, 50 metres wide, and 45 metres high, would have one of the largest unsupported rock span ceilings in the world. Two light-wells are proposed to allow visitors to view the sun or other stars from inside the mountain, which is composed of trachyte (an extrusive volcanic rock) with intruded igneous dykes. Lead consultant for the project Arup already has considerable experience of cavern excavation at, for example, the CERN super collider cavern near Geneva (Switzerland.)

Source: *New Civil Engineer*, 10 June 2004, and 17 June 2004, page 23.

The Big Dig at Boston (USA)

Interstate Highways I - 90 and I - 93 meet in the centre of Boston, and, partly on an elevated section or flyover, did nothing for the quality of life in the immediate area. The city-centre parts are being re-located underground, with the addition of an eastern link below Boston Harbour (the Ted Williams Tunnel) to Logan Airport in East Boston. About half of the 12 km of new highway is being tunnelled at shallow depth in exceptionally difficult ground containing, *inter alia*, 'decomposed soil and rock', fractured marble and limestone, and made ground containing old concrete foundations and all manner of other urban detritus. A particularly difficult section was required to be tunnelled below the approaches to the busy Boston South railway station, which has 400 train movements and 40,000 commuters per day.

Initially the work was planned to be by the 'cut-and-cover' method, but it was appreciated that this would be exceptionally disruptive and expensive. A significant proportion is being done by 'tunnel-jacking' on a far larger scale than hitherto. For example, three full-size Inter-state highway tunnels 240 metres long, made up of box sections each 24 metre wide and 12 metres high, have been 'tunnel-jacked' (forced horizontally) through ground immediately below the busy railway tracks without disrupting train timetables or performance. The ground penetrated was frozen to make this feasible. The entire scheme is scheduled for completion in 2005.

Source: Alan Powderham, et al., 2004, Boston's massive jacked tunnels set new benchmark. *New Civil Engineer International*, August 2004, 22 - 30.

Road tunnelling in Sydney (Australia)

A 100 tonne road-header tunnelling machine broke out to daylight in Sydney recently, having been at work underground for 10 months. This was one of two such machines making the Cross City Tunnel. Unusually, both started from the base of a single central shaft in the 2.1 km route and tunnelled away from each other.

A proposed M4 East tunnel in the city is currently under consideration. The initial plan was for a relatively short tunnel, but environmental considerations have led to a proposed 1km extension. If approved, construction might commence in 2007, with completion in 2009 or 2010.

Source: *New Civil Engineer International*, August 2004, page 7.

Arup to design Chinese subsea tunnel

UK consultants Arup are to carry out design work for China's first under-sea tunnel, to link Xiamen Island to the mainland. This would be a six kilometre road tunnel, to replace two bridges which are closed to traffic several times .each year on account of typhoons. Two three-lane running tunnels and a central service tunnel are envisaged, with 4.5 km of the total length below the sea. The main section will be drilled and blasted through granite bedrock.

The smaller diameter service tunnel was scheduled to be commenced in September 2004. Tunnelling of the main bores should take four years from the intended start-date of June 2005.

Source: *New Civil Engineer International*, August 2004, page 7.

Part of the London Crossrail system has been completed!

Part of the essential works of London's proposed Crossrail system, which it is intended will allow full-size mainline trains to pass rapidly east-west below

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central London, has already been completed. In the floor of the lower basement of the newly-built Moor House office block is an 8.2 metre diameter vertical shaft, 40 metres deep. This has been constructed in readiness for the Crossrail tunnels, and a new Crossrail station adjoining the existing Moorgate LTE Station, and is intended to act as an air pressure relief shaft, releasing air pushed ahead of the new trains. If built, the Crossrail station tunnelled ticket hall will be 40m deep, 20m wide, and 240m long. The new shaft has a temporary lining with a design life of 21 years. In the event that the Crossrail project does not go forward, in which event the shaft will be relined, the excavation will probably be filled-in again!

Sinking the shaft through London Clay and the underlying Lambeth Group sands and gravels, as the office block was erected above the site, called for much skill and care. At one point the closest of the piles on which the tower block stands is only two metres from the shaft. The entire design has also had to take account of stability issues associated with the anticipated Crossrail running tunnels and station excavations, not to mention ground-water rising at about 1 metre per annum, leading to ground-swelling and buoyancy effect on foundations. The piles are driven deeper than the shaft, into the Thanet Sand.

Source: *New Civil Engineer*, 29 July 2004, 18 - 19.

A road tunnel designed to carry no regular traffic at Fréjus (France / Italy)

A second bore is to be added to the 12 km single-bore Fréjus road tunnel under the Alps between France and Italy. The second tunnel, intended only as an escape tunnel for use in emergencies, is planned in response to concern about the safety of single-bore road tunnels following the Mont Blanc tunnel fire in 1999 when 38 died.

The new tunnel, about 4.8 metres in diameter, should be completed by 2011. The 10m diameter main tunnel carries between 3,500 and 4,000 lorries daily, and has ventilation ducts above a false ceiling.

The new tunnel will also allow access for the construction of more closely-spaced fire shelters, 400m apart instead of the current 1.5 kilometre spacing.

Source: *New Civil Engineer International*, August 2004, page 9.

Delhi Metro Phase I now nearly half completed

Phase I of the new Metro system for Delhi (India) is intended to comprise three lines, with 68.3 km of track and 59 stations. The target date for completion is September 2005, although less than half has been built so far - Line 1 was finished in 2002. Line 2 includes an 11 km underground tunnelled section, and is proving difficult as the tunnel boring machines are having, in places, to cut through tough quartzite rock. Line 2 has yet to be started. The twin bore tunnels will be 10 metres wide and nine metres high.

Four other Indian city administrations (Chennai, Hyderabad, Bangalore, and Ahmenabad) are contemplating building Metro systems, and are following progress in Delhi with close attention.

Source: *New Civil Engineer*, 3 June 2004, 20 - 21.

Progress on the Dublin Port tunnel (Ireland)

The Dublin Port road tunnel is being built to link the Port with the Irish M1 motorway. Work commenced on 5 June 2001 and will, it is hoped, be completed in 2006. Its 4.5km length includes a central twin bored tunnel of 2.6 km partly made through Carboniferous Limestone, and partly through boulder clay. At first the New Austrian Tunnelling Method was to have been used, but plans were revised in favour of boring and lining by tunnel-boring machines (TBMs) following the collapse of the Heathrow Express tunnel at London's Heathrow Airport. At one point the tunnel passes 2.9m below the main Dublin - Belfast railway line, leading to some disruption of train services.

The bore section was commenced from a 56m diameter, 30m deep TBM launch-pit. One of the two machines, 156m long and weighing 1,600 tonnes, started work on 7 May 2003, reached the far end of one bore in July 2003, and was in May 2004 two-thirds of the way back to its start point, having cut mostly through limestone. The second machine, working mostly in boulder clay, is 60m long, weighs 1,100 tonnes, and by last May had bored 800 metres.

Source: *New Civil Engineer*, 20 May 2004, 18 - 21.

Secret underground bar and cinema discovered in Paris

Since 1955 it has been an offence, for security reasons, to 'penetrate into or circulate within' most of the estimated 170 miles of 'tunnels, caves, galleries, and catacombs' lying below large parts of Paris. These spaces are policed by the city police force's Sports Squad. In the course of a training exercise beneath the Palais de Chaillot, the Squad recently discovered a 'fully equipped cinema - cum - restaurant' in a 'large and previously uncharted cavern' below the 16th arrondissement. The complex was entered by a drain next to the Trocadero, and access was 'protected' underground by a tarpaulin marked 'building site - no access.' Behind this the

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tunnel contained a desk and a closed-circuit television camera set to automatically record visitors. The mechanism also triggered a tape recording of barking dogs. The tunnel led to a 400 square metre cave about 18 metres below street level, with rock-cut terraces for seating as in an amphitheatre. Here were found a cinema screen and projection equipment, and tapes of numerous films, none of them, reportedly, 'banned or offensive.' Nearby in a smaller cave was a was a restaurant and bar. The complex was found to be equipped with a professionally installed electricity system, and at least three telephone lines.

During a subsequent visit, with French electricity board representatives, it was found that the supply cables had been cut, and a note left which read 'Do not try to fund us.'

Source: Charles Bremner, 2004, Tunnels of love create security scare. *The Times*, 13 September 2004, page 14; Jon Henley, 2004, In a secret Paris cavern, the real underground cinema. *The Guardian*, 8 September 2004, page 1; Jon Henley, 2004, Paris's new slant on underground movies. *The Guardian*, 11 September 2004, page 19.

Death of Sir Alastair Morton [1938 - 2004] - the man who 'rescued the Channel Tunnel'

Sir Robert Alastair Newton Morton, born in Johannesburg on 11 January 1938, died on 1 September 2004. In his capacity as British co-chairman of Eurotunnel he was responsible for keeping the project running through to completion, when escalating estimates and costs threatened to prejudice its financing. It was his belief, expressed in a lecture to the former Channel Tunnel Association, that the way forward for Channel Tunnel rail passenger services was in the development of 'ordinary' regular-interval trains from a variety of places in Belgium and France to and from a variety of destinations in England, rather than the Eurostar trains 'pretending to be an airline' shuttling back and forth only between London and the Belgian and French capitals.

Source: Obituary. Sir Alastair Morton. The man who rescued the Channel Tunnel project, he was committed to developing public-private initiatives. *The Guardian*, 3 September 2004, page 31; Obituary. Sir Alastair Morton. Chairman of Eurotunnel who steered the controversial rail project through financial crises to a surprise completion. *The Times*, 3 September 2004, page 39.

Tunnels under La Santé high security jail in Paris

La Santé is the main high security jail in Paris, accommodating millionaire fraudsters, corrupt politicians, Islamic militants, Basque separatists, and others. Reports of unexplained sounds from below the prison led to investigations which revealed that old quarry tunnels between four and 17 metres below the foundations which had been blocked up when the structure was built in the 19th century had been re-opened by persons unknown. Tunnels were found underneath two of the establishment's watchtowers and the main gates. As there had been no attempt to excavate shafts up towards the prison, it was thought the tunnels were not being developed as escape tunnels. But the jail's most dangerous prisoners have been removed elsewhere, and tunnels re-sealed. Who was working in the tunnels and why remains a subject for speculation, with a planned terrorist attack seen as a possibility.

Source: Jon Henley in *The Guardian*, 2 September 2004, page 19.

Underground uranium 235 enrichment plant at Natanz, Iran

A recent report on Iran's recent resumption of enrichment of uranium 235, for possible nuclear reactor or atomic weapons purposes, notes an underground facility for tis purpose at Natanz. The centrifuge process using gaseous uranium hexafluoride is used.

Source: Ian Traynor in *The Guardian*, 2 September 2004, page 19.

Peak District Mining Museum's 25th Anniversary

The Peak District Mining Museum, at Matlock Bath (Derbyshire) celebrated its 25th anniversary with a programme of lectures, video presentations, demonstrations, and a 'Great Pie and Pea Supper' on 24th April 2004.

Source: *Bull. Peak District Mines Historical Society Ltd* 110, 1 - 2.

Below ground at the British Library at St. Pancras

The Piazza fronting the British Library at St. Pancras is in fact effectively the roof of an eight storey building. This contains the four double-height basements in which 12 million books, and millions of other items, are stored, up to 24 metres below street level. The lowest basement is as deep as the nearby Victoria Line tunnels. A quarter of a million cubic metres of soil excavated to form the basements were used to build a dry ski slope at Beckton, east London.

Apart from the books and other materials, the basement of course contains advanced systems to protect the contents from fire and flooding, and to maintain an optimum storage environment, currently

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between 45 and 60% humidity and a temperature between 16 and 19° celsius.

Of the 257 kilometres of shelf space at the Library, 217 kilometres are in the basement, 94% of it already in use. As 3.7 kilometres are used every year to accommodate new accessions, the basement is expected to be filled by 2005/2006. The Library does of course have other depositories for less frequently consulted materials, including one at Woolwich and one at Boston Spa near Wetherby in Yorkshire. Requested items are fetched to St. Pancras as required.

Two thirds of the basement shelving is in the form of mobile units, so there are few walkable alleyways between banks of shelves. St. Pancras contains all material published before 1851, along with high-use material (defined as stock five users per linear metre per year.) The on-line catalogues and book ordering terminals in the reading rooms transmit book orders to the basements, where details are printed out, Approximately 60 full-time staff work in the basements, and locate the books required and send them up to the reading rooms by way of a 1.6 kilometre conveyor belt system. Fragile items are delivered by hand. The busiest basement level is the third down, with an average of 39,037 items used per month.

Source: British Library leaflet *Basement Facts* (undated but circulated via the reading rooms during 2004)

Wolverton Hall (Worcestershire) with tunnels on the market

Wolverton Hall, dated 1714, in the Vale of Evesham is (August 2004) on the market, offers in excess of £ 1.5m being invited. The house has associated tunnels of, it is thought, much the same date, and is of interest in having been the local headquarters of the Auxiliaries during World War II (featured in a book *The Mercian Maquis: the Secret Resistance Organisation in Herefordshire and Worcestershire during World War II* by Bernard Lowry and Mick Wilks.

Source: *The Times (Bricks and Mortar)*, 27 August 2004, page 8.

English railway tunnels works

In addition to work currently in hand at the Higham and Strood railway tunnels (and formerly canal tunnels) in Kent, previously reported, two further English railway tunnels are temporarily closed in August 2004 for engineering works. The main line to South Wales was closed for three weeks between Bristol Parkway and Swindon stations to facilitate improved drainage for the Chipping Sodbury tunnel, where trains have often been delayed by flooding. Chipping Sodbury tunnel is two miles 924 yards, and was built in 1900 - 1903 for the Great Western Railway. The much shorter Ipswich tunnel to the south of the station at Ipswich was also closed from 11 July to 5 September to allow it to be enlarged to accommodate container traffic to and from the docks at Felixstowe.

Source: *Modern Railways* 61(671), pages 8 and 16 (2004)

The Association for Industrial Archaeology's Annual Conference - University of Hertfordshire, Hatfield

The AIA held its Annual Conference at the de Haviland Campus of the University of Hertfordshire during the week end 13 - 15 August 2004. As usual, the conference proper was preceded by a full-day seminar, on the Friday, for the presentation and discussion of current work and research. During the afternoon there were two presentations by Subterranea Britannica members. Paul Sowan (Chair) spoke on the archaeology and interpretation of chalk mines, with illustrations and data for the Emmer Green (Reading) mines, the earliest of which dates from at least as far back as the 18th century. Archaeological observations can be used to assess the extent to which these mines were worked, primarily or secondarily, for chalk blocks for building, for chalk for burning to lime, for chalk for incorporation in the clay used in brickmaking, and for flint for building or roadmaking.

Joep Orbons (of Maastricht) explained aspects of the study, conservation, and management of the underground building-stone quarries of Zuid Limburg and adjoining parts of Belgium. There are in this area some 500 underground quarries containing 500 miles of tunnels, accessed via 800 entrances - about two thirds in the Netherlands and one third in Belgium. Many of these are very small quarries, but a few are very extensive. Floor to ceiling heights can be up to 16 metres or more. The oldest dated graffito recorded is of 1468. Fifteen important quarries are now managed by a publicly-funded voluntary foundation.

Joep's presentation included views of a recent crown hole developed on the Luikerweg (the original main route to Liège, although now by-passed as a through road.) This effectively now prevents access from the St. Pietersburg quarry tunnels to the bottom of the staircase and well at Fort St. Pieter. Mapping of the Sibbe underground quarries (a part of which is still in work) near Valkenburg was also demonstrated.

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Quarrying near Lesser Garth Cave and ancient iron mines

Lesser Garth Cave, one of the last refuges of a rare cave spider, and ancient iron mines near Taffs Well, north of Cardiff, are threatened by proposed extensions of the Taffs Well quarry, which work may include the driving of an access tunnel below the cave. Planned surveying of the largely flooded mine had not yet been completed. An archaeological survey has revealed evidence for human activity at the cave c. 2000 BC. Iron artefacts from the first century AD are indicative of ancient haematite (iron ore) mining at the site. The proposed quarry extensions seem likely to destroy and remove any further archaeological evidence.

Source: Chris Howes, 2004, Quarrying near Lesser Garth. *Descent* 179, page 11.

Wemyss caves slowly disappearing

The group of sea-caves in soft sandstone behind a raised beach at East Wemyss, near Kirkaldy (Fife), with wall carvings dated from 2000 BC to the Viking era, are threatened by marine erosion, despite the construction of coastal defence works by Fife Council and Historic Scotland. Earlier in 2004 the Cailpie caves 25 kilometres to the east, with medieval carvings, disappeared overnight as a result of a large landslip.

Source: Alan Jeffreys, 2004, Wemyss caves slowly disappearing. *Descent* 179, page 17.

A new undersea road tunnel in the Faroe Islands

The Faroes consist of 18 principal islands, of which 16 are more or less permanently inhabited. The capital, Tórshavn, is on the largest island, Streymoy, in the centre of the group. The airport is on an adjoining island, Vágar, to the south-west of Streymoy. These two islands are now linked by a long undersea road tunnel, from east of Kvivík on Streymoy to east of Oyrargjógv on Vágar. The former Westmanna to Oyrargjógv ferry no longer runs, leaving the former place (a small town) rather isolated at the dead end of a road. Oyrargjógv has never been much more than a landing stage. Interestingly, the precipitous nature of the sea cliffs of both islands has dictated that the tunnel does not take the shortest possible route (about 1 km north south) below Vestmannasund, but is of the order of four times that length, and aligned more or less east-west. The toll for using the tunnel is 180 Faroese (Danish) kronur.

Source: Jan Paul van der Pas

Hydroelectric power station tunnelling in east Iceland

A new hydroelectric power station is under construction at Kárahnjúkur in eastern Iceland, intended to serve a new aluminium smelter on the east coast at Fjarðaál in Reyðarfjörður. Water is to be tapped from two large glacial rivers having their sources north-east of Vatnajökull, Iceland's largest icecap. The Jökulsá í Fljótsdal and the Jökulsá á Dal rivers rise to the west and east of the prominent mountain Snæfell, abstracted water being fed into a single large dammed reservoir, Hálslón, from when it is to run to the generating plant. The entire project incorporates 72 kilometres of tunnelling. The option of linking the two rivers via diversion tunnels was adopted, following an environmental impact assessment, to allow a single reservoir to be constructed at Háls, rather than one at Háls and another at Eyjabakkar, which had been disputed on environmental grounds.

Sources: leaflet published by Landsvirkjun supplied by Jan Paul van der Pas / SCHÜNMANN, Damon, 2004, Dams: power steering. Iceland is building what it claims will be one of the largest concrete faced rockfill dams in the world. *New Civil Engineer*, 9 September 2004, 16 - 18.

The Dulley 'caves' near Sittingbourne, Kent

Rod Le Gear has recently written-up and published, with interpretative comments, a small chalk mine associated with an open pit about 1.6 km south east of Bapchild, near Sittingbourne (TQ 9364 6181) base on field notes made by the later Jim Bradshaw. The open pit is now backfilled and levelled, with no visible evidence for any mining activity.

Three tunnels led in from the chalk face, in a north-easterly direction, with cross passages linking them. The three main tunnels were about 3.3 metres wide, six to eight metres high with arched profiles, and had been worked in three lifts. The cross-passages were not so high, and thus possibly made later than the main ones. In the west wall of the western tunnel the bottom of a blocked shaft was noted, which could be correlated with a slight depression in the orchard above.

Rod Le Gear's article includes a plan and sections of the mine tunnels from Jim Bradshaw's notes, which also mention remnants and traces of other tunnels, more or less blocked, but not accessible for more detailed survey.

Source: R.F. Le Gear, 2004, The Dulley 'caves.' *Kent Archaeological Review* 157, 158 - 160.

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Air conditioning for London Underground

The London Underground suffers two problems, one of which it is now thought might prove the answer to the other. Quantities of water have to be pumped from the tunnels, to prevent flooding. And the air in the tunnels can be uncomfortably warm as a result of operating trains carrying millions of passengers. It is now proposed to pass the water and air through heat exchangers, cooling the air which can then be returned to the stations and tunnels. The slightly warmer water would then, as now, be pumped to the Thames. This of course assumes that the water in the tunnels is significantly colder than the air.

Source: Ben Webster, 2004, Underground river to cool passengers on sweltering tube. *The Times*, 15 July 2004, page 3.

Uranium mining in the Democratic Republic of Congo

The Shinkolobwe mine in Katanga province of the Democratic Republic of Congo, 100 miles west of Lubumbashi, yields ores of cobalt, copper, nickel, platinum and uranium, and was the source of the uranium used as source material for the atomic bombs dropped on Hiroshima and Nagasaki, Japan, in 1945. Forty shiploads of uranium ore were shipped to the USA in 1939 for this purpose. The mine was closed, by the then Belgian authorities, in 1960, and 'filled with concrete.'

However, mining continues, at a very primitive level, with reportedly currently 15,000 self-employed miners operating illegally, and selling the ores on the black market. Local furnaces operated by Chinese, Indian, and Pakistani businessmen, are smelting the ores and exporting them to world markets via Zambia. This operation is viewed with concern by the international community, in view of the possibility of radioactive materials falling into the hands of terrorists wishing to construct 'dirty' bombs, if not truly nuclear fission weapons.

Source: Michael Dynes, 2004, Terror fear over the mine that fuelled Hiroshima. *The Times*, 22 July 2004, page 16.

Diving in some of the World's deepest sewers, in Mexico City

Mexico City's 850 miles of sewer pipes and tunnels serving its metropolitan area 'twice the size of London' date from the 17th century and onwards and were greatly extended in the 1970s including works as deep as 200 metres below the surface. The City employs the world's only full-time sewer divers (a team of four) to inspect and maintain sewage pumps up to 100 metres below the surface.

Source: Jo Tuckman, 2004, Sewage divers go through the motions. *The Guardian*, 10 July 2004, page 17 [Mexico City: sewers]

A Palaeolithic 'Sistine Chapel' discovered in Church Cave, Creswell Crags, Nottinghamshire

Following the recent discovery of the first cave art known in Britain, in the caves at Creswell Crags on the Derbyshire / Nottinghamshire borders near Worksop, an entire cave ceiling filled with carvings tentatively dated to 13,000 years before present has been announced. Discoveries in 2003 of 'images of animals, dancing girls and female sexual parts' at Creswell Crags are held to 'show conclusively that ancient Britons were part of, rather than excluded from, a continent-wide culture.' A total of 96 figures has been reported.

Source: David Ward, 2004, Sistine Chapel of the ice age discovered. Experts hail elaborately carved cave ceiling. *The Guardian*, 14 July 2004, page 7.

Copper mining at Mount Gabriel, Co. Cork, Ireland

A recently published paper by S. Stephen Briggs reports the archaeological investigation of some 30 shallow pits and adits at Mount Gabriel. These have been believed to have been of Bronze Age date, a thesis supported by radiometrically dated charcoal from the second millennium BC in them. However, no diagnostically Bronze Age cultural debris has been found, and the charcoal is thought possibly to have been washed into the pits or adits from nearby peat deposits. What have been taken to be Bronze Age workings have been shewn to coincide with known trials during a later known historic mining phase.

Source: S. Stephen Briggs, 2004, The archaeology of copper mining on Mount Gabriel, Co. Cork, Ireland. The Archaeological Journal 160, 200 - 228.

News from South Crofty tin mine (Cornwall)

A group of former Cornish tin miners, named Baseresult, is attempting to recommence mining at South Crofty, proposing to employ 200 persons. However, the Government- and EU-funded body CPR [Camborne, Pool and Redruth] Regeneration has initiated the purchase the mine for conversion to use as a leisure centre. The mine occupies an area of 13 hectares (33 acres), and has 300 miles of mine galleries, some dating from the 18th century. The lowest 800 metres of the 872 metre deep mine are flooded. Tin reserves are estimated to be sufficient for 80 years further mining.

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Baseresult proposes the erection of new ore processing plant below ground, with the surface de-developed as a mining heritage centre and a residential development of 250 flats and houses. The two parties are in discussion concerning their plans.

Source: Patrick Barkham, 2004, Clash in the dark over renewal of Cornwall's tin heritage. *The Guardian*, 17 May 2004, page 24 [Includes an underground photograph]

Egyptian tomb 4000 years old discovered

Egyptian and Polish archaeologists have discovered a necropolis near the pyramids at Saqqara, 15 miles south of Cairo, containing the 4,000 year old stone tomb of a royal official called Ny-Ankh-Nefetem, identified in hieroglyphics as 'the god's servant of the pyramids of the Kings Unas and Teti, and thus datable to 2,375 to 2,291 BC. The rectangular stone chamber is decorated with well preserved painted scenes from the deceased's daily life.

Source: ANON, 2004, Egyptian discovery: archaeologists unearth 4,000-year-old tomb. *The Guardian*, 1 January 2004, page 14 [Includes photograph of interior of tomb]

Paddington Green Police Station: underground cells

Paddington Green Police Station, near the London end of the A40, once used for the filming of *Dixon of Dock Green*, has in more recent years been a holding station for terrorist suspects. 'At one stage the cells were at ground level, but today the cell block, which has recently been refurbished and includes 15 cells, is subterranean.' Whether this means the existing cells have been rendered subterranean by making up the surrounding ground level, or an entirely new basement floor has been excavated, is not clear.

Source: Stewart Tendler, 2004, Britain's terrorist fortress. *The Times*, 11 March 2004, page 6.

London Crossrail

The debate about whether or not to go ahead with the proposed east-west underground railway link, Crossrail, continues, with the Mayor for London's recent statement in favour of wide-ranging development, improvement, and augmentation of the capital's public transport links. Crossrail would link the national rail network west of Paddington and east of Liverpool Street, with new tunnels sufficiently large (unlike the London Underground tubes) to take main-line rolling-stock.

Source: Andrew Clark, 2004, Mayor bids to reshape London's transport network along new lines. *The Guardian*, 7 July 2004, page 10

Wartime tunnel losing its final battle

60 years on, how time is catching up with historic secrets. Mysterious underground tunnels near Kinver could be opened up for the last time this month after damp weather left them in a poor state. A tour of Drakelow Tunnels is arranged for this month but the growth of mould and fungi caused by damp weather means this could be the last visit.

The Friends of Drakelow Tunnels have their fingers crossed, however, that the predicted cold winter will slow the deterioration and allow more tours next year. The tunnels were built in the Second World War as a parts factory for Bristol Aircraft Company that would be hidden from enemy fire. They were used in the 1960s and again in the 1980s as bunkers for local government officials in the event of ware, After the cold war ended the Home Office sold the tunnels to an anonymous buyer who has never been named.

But the secretive owner does allow occasional trips around the bunkers. Founder member of the Friend of Drakelow Tunnels, Paul Stokes, said "I hope this tour is not the last one"." I've been involved with the tunnels for 11 years now - I still enjoy giving the tours and they are always sold out." The two hour tour is on Sunday November 28 at 11am and will take in part of the original factory and the two bunkers.
The cost is £6.50 for adults and £4 for children and places must be booked in advance via www.drakelow.org

Source: Stourbridge News 18 Nov 2004

Video - A Tour of Carrs Mine - exploring the Nenthead Visitor Mine

Price £12.95 running time 31 minutes

I purchased a copy of this video expecting too see a film of a family wearing brightly coloured helmets having a jolly romp through a sterilised mine passage listening to a student guide on his last day still using his hand written script of witty jokes and book of useless information .

I expected to see the occasional dummy in pose, or suggestions that stalagmite formations could be interpreted as the Swiss Village or to be told that shadow cast accidentally by the 1000 watt searchlight looks just like the template for "T'Angel o t'North".

Well nothing of the sort this is a professional high quality informative documentary, which includes buildings and features on the museum site including a view down into the 90 metre deep brewery shaft. You are provided with information about the

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importance of water, waterwheels, launders and respective machinery. It is written and produced in such a way that there is no time to be bored it is exciting and informative at the same time.

As you enter the underground sections there is a very clever use computerised graphics showing a simplified mine locator and identifying where on the tour you would find yourself. What I like most about this film is that the features of Nenthead Mining with Horse levels, mineralisation, flats, rises, stone arching , pit props, stemples, and many other mining features are presented as there are and not tourist impersonations. You find yourself captivated by sheer grandeur and hard work that went into these mines.

The production methods are explained and video clips of mining methods are slipped in to demonstrate further working conditions that would expect to find. The video is highly informative and provides a details of the history of the mine and its various owners.

The producers were not just satisfied with the tourist bit but as a taster of some of the many highlights of Nenthead Mining you are shown areas where the public do not go and you also see explorers in many of other levels on the site.

See if you can spot a young slim Adrian Pearce, Mole in his best yellow one piece, Steve Holding, Stuart Tomlins oh and of course yours truly I had forgotten assisting one sunny day sadly the real stars Peter and Kelvin never appear. I should mention peter Wilkinson who was the guide on this film whose knowledge and love of these mines is second to none.

This is an excellent video and a real credit to their expertise and patience in producing this Mining History record in a format that is accessible to all.

The video is available direct from IA recordings, PO Box 476, Telford, Shropshire, TF7 4RB England or ordering via their website WWW.iarecordings.org or from Moore Books www.moorebooks.co.uk

Book - Waller's Description of the Mines in Cardiganshire

David Bick , Card cover 64pp ,landscape quarto size, colour photos and prints throughout.

Three Centuries ago, the silver lead mines of Mid Wales were highly prized and after a rich discovery , the Company of Mine Adventurers was launched in a fanfare of publicity to work them.

In 1704 to aid the promotion, William Waller, the manager compiled his Description of the Mines in Cardiganshire, with a series of maps and plans of the mines and smelting works. They were the first of their kind to be published and have long been regarded by Historians and Industrial Archaeologists as prime source material. To mark the tercentenary this volume contains a complete facsimile reprint of the original which is now very scarce. Also included are a number of supplementary colour photos, modern explanations written by David.

The book reflects David's enthusiasm and knowledge of the subject. This is an excellent publication and one of the best I have seen for some time. I only received them today and had to read it immediately. This is genuinely great mining history publication and should sit with pride of place on your bookshelf.

Cost £9.99 plus £1.00 p&p from Moore Books www.moorebooks.co.uk

Harry Pearman elected an Honorary Member

The Constitution of Subterranea Britannica allows for a maximum of 10 Honorary Members at any one time, of whom one if the President, currently Professor Tim Shaw.

Honorary membership is conferred by the Committee on persons who have rendered exceptional and sustained service to the Society over an extended period of years, or who have made a major and sustained contribution to the study of man-made or man-used underground space.

Harry Pearman's election to Honorary Membership is in recognition of his work since the 1950s, principally with the Chelsea Speleological Society and the William Pengelly Cave Studies Trust.

In particular, he has (with the assistance of others) located, explored, surveyed, and published details of very large numbers of underground sites in and around the south east of England. These have been published, primarily, in the *Newsletter* and the *Records of the Chelsea Speleological Society*, from 1959 onwards.

His principal works have been Records CSS 3 (*Secret tunnels in Surrey* (1963)), 4 (*Deneholes* (1966)), 5 (*More secret tunnels in Surrey* (1968) jointly with John Henderson and Brian Hillman), 6 (*Caves and tunnels in Kent* (1973), and fifteen parts of *Caves and tunnels in south-east England* (CSS Records 7 - 8, 11 - 17, 20, 22 - 24, and 26 - 27 (1976 - 2002.)

ROC Post Owners Group or ROCPOG

In a hobby as acronym infested as military history, I know that one new one won't cause too much of a storm, so I'd like to announce the formation of the ROC Post Owners Group or ROCPOG.

The Group has been assembled from all of the Sub Brit members who own or look after posts, supplemented by a few non-members that we have managed to track down. So far we represent 23 owners and 19 posts, but the list is still growing.

The Group is very informal and it is free to join. It has been brought together to share information on the history of the ROC monitoring network, help owners to locate post equipment, and advice on the physical aspects of looking after these little fragments of Cold War history.
Our early wins include cheap Public Liability Insurance and a source of new hatches and locking bars and in the future we will be working together with the Sub Brit website to organise open days when visitors will be able to look around restored posts.

If you own, or care for, a post and you have not yet joined us, please contact John Smiles at smileysquad@btinternet.com or on 07970 811121.

Ashwell ROC Post in Hertfordshire

If you don't own a post but would like to get involved in helping to preserve a local one with a bit of painting or weed-whacking, please also get in touch - we have members from Stirlingshire to Kent and most would really appreciate a helping hand.

The Sub Brit Day Conference - Saturday 16th April 2005

Twice a year Sub Brit holds a day conference, and, as day conference organiser, it falls to me to set up and run these days for the members.

The format of the day includes 3 or 4 speakers on various subterranean topics, a film and the very important 'member contributions' section where members are actively encouraged to give a short presentation on a suitable topic of their choice.

In recent years, the speakers have included people such as Duncan Campbell and Peter Laurie, with topics as diverse as the WW2 Auxiliary Unit Hides, The Bunkers of East Germany, London Underground and numerous cave and mining subjects.

Increasingly, SB members are giving talks on varying subterranean subjects. Sub Brit is always looking for good speakers on subterranean topics so please get in touch if you would like to give a presentation, or know someone who would.

Our next Day Conference is on Saturday 16th April 2005 at Imperial College in London.

You will find a booking form and programme details enclosed with this issue of Subterranea. The line up includes Stewart Wild talking about the underground Australian mining town of Coober Pedy, Terry Andrews gives a presentation on the WW2 German U-Boat pens, Neville Cullingford from the ROC museum and Andrew Emmerson on the history of London's tube network. In addition to this we will have the first public showing of the 'Germany 2002' film by SB member Mark Bennett.

The Day Conferences are a great way to meet fellow members, discuss subterranean matters and get involved on trips and events – all SB members and their guests are welcome.

We usually see between 80 and 150 members attending these conferences. The Spring 2004 conference was a total sell out.

Don't worry if you've never been to a Day Conference before. Maps and joining instructions are sent out 2 weeks prior to the event and the venues are easy to find.

So what have you got to lose? Come along and join in with 2 of the major events on the SB calendar.

Andrew Smith
Day Conference Organiser.

Who's Who in Sub Brit

Nick Catford - Membership Secretary

Nick Catford was born in Hammersmith, living in Wimbledon until 1958, Sutton till 1996 and now Swanley in Kent. He was educated in Sutton Grammar School later attending Sutton College of Liberal Arts to study Photography at A Level and Richmond Upon Thames Collage where he studied General Photography and Advanced Colour Photography, receiving City & Guilds Certificates.

His photographic skills have led to a number of journalistic jobs in the local press and during the 1990's Nick worked for a number of country music magazines touring the UK to report and photograph music festivals. Nick has always had a love of music, especially which from the 1950's and 1960's and during the last forty years he has amassed a huge collection of vinyl records now well in excess of 50,000. That love of music lead him into radio where he has worked as a part time DJ and presenter on and off since 1969. He is currently working for South West London based Radio Jackie, an independent local radio station broadcasting from Tolworth on 107.8 MHz.. Nick presents a fortnightly oldies programme on a Sunday evening. Nick is also a lapsed radio ham.

Nick's other passion is for industrial archaeology, in particular windmills, watermills, disused stations, disused canals and mines. Again he has traveled around the country visiting and photographing industrial sites with a photographic archive also in excess of 50,000 photographs. This passion led him to join Subterranea Britannica in 1984 where he was quickly able to indulge his interest in the exploration and photography of abandoned mines and quarries. Joining Sub Brit opened up a plethora of other kinds of underground sites and over the past 8 years Nick has taken a particular interest in underground military sites and structures of the cold war.

In 1996 he embarked on a survey of underground Royal Observer Corps bunkers. Initially this was limited to South East England but having started the job there seemed little point in not finishing it so in the following 7 years he visited every ROC post (1563 in total) in Great Britain (including Northern Ireland). The results of this research have now been published on the Sub Brit web site. Nick is now part owner (with three other Sub Brit members) of an ROC post in Essex which is currently being restored to its original operational condition.

Having completed the ROC survey Nick is now working on a survey of Chain Home and Rotor Radar Stations.

As well as traveling the length and breadth of Great Britain and the Channel Island, Nick has also pursued his interests abroad, in America, the Middle East and in particular Europe with regular excursions to Germany and France and this year to Sweden and Gibraltar to photograph and explore underground military installations.

Although not 'webmaster', (Nick describes himself as a computer dummy) Nick is now the major contributor to the Sub Brit web site, regularly delving into his photographic archive to bring new and interesting underground and military sites to the attention of the public.

Nick reluctantly took on the job of membership secretary three years ago and during that period the Society's membership has increased four fold.

What does the future hold? Who knows? Nick hopes to continue with Sub Brit for many years, visiting forgotten holes in the ground here and abroad and continuing to work on what he considers to be by far the most important part of Sub Brit's activities the web site, which, in recent years, has received critical acclaim from numerous government departments and military agencies in Britain and abroad.

Under Cover Activities

The word 'insurance' promotes a feeling of intense drowsiness in most of us, especially when it's something that comes bundled up with your hobby even though you never actually asked for it.

For all that, we have to recognise that insurance is an essential tool in getting us access to underground sites as most landowners insist that we have it before they'll let us in. Having the right cover was essential in getting us into Fort Southwick, the ROTOR bunker at Wartling in Sussex and even PADDOCK; in short it's a necessary evil.

Following nearly a year of talks between Sub Brit, the British Cave Research Association (BCRA, to whose scheme we subscribe) and the insurers, our policy has finally been renewed and the money sent off.

Thanks to some canny negotiation by your Committee, you can also bask in the glow of a good deal as we've even secured a discount on the grounds that our sites are often a lot less hazardous than potholes.

Without being patronising, it is very important that you understand what this cover is, and what it protects you against.

BCA insurance is for THIRD PARTY LIABILITY ONLY.

It is NOT personal injury insurance and its sole purpose is to indemnify a landowner in case you do something underground that leaves him open to litigation. You get no protection from it personally.

Let me explain by way of an example:

I go into an old mine and while taking photos, I back into a decaying pit prop, the roof caves in and when I am rescued (with a broken leg) I find that the collapse has made the landowner's next door neighbour's house fall down. Oops.

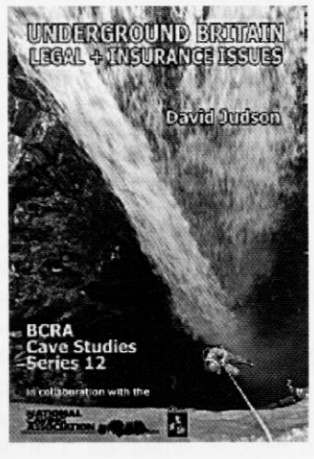
When the neighbour sues, the insurance will pay for the lost house and any injuries suffered by its occupants. My broken leg and loss of earnings is my problem.

It's worth noting that if I was busy kicking over the pit props for fun to see what would happen, the insurance company will invite me to take a hike and I will be personally liable anyway. No insurance covers you for gross stupidity or active negligence.

Every member of Sub Brit pays a small part of their subscription towards what the scheme terms 'armchair explorers'. This rate covers you for corporate risks (for the decisions made by the Committee for instance) and, indeed for most of the site types which we like to explore. Broadly speaking the policy covers all types of 'dark spaces', even if they are lit, but this is an indistinct definition and a better way of putting it might be to say that if a site is built, rather than just excavated, then you are fine. 'Armchair explorers' get no documentary evidence of their enrolment in the scheme but if required, you can get details of the scheme and a letter confirming your membership of Sub Brit from the Membership Secretary.

For all other site types (mines, dene holes, chalk wells, unlined tunnels, chalk wells, cave houses, etc) you will need to up rate your cover to full 'caver' rate – a distinction that will currently cost you an additional twelve quid. Most members who require caver rate currently do so through other clubs (I get mine through the Wealden Cave and Mine Society for example) but Sub Brit can arrange cover for those who require it via the Secretary. Caver rate subscribers get their own little membership card from the BCRA.

If you really want to look into the details of the policy, the full text, plus a five-page Question and Answer document, can be downloaded from the BCRA website at www.bcra.org.uk or by writing to The Old Methodist Chapel, Great Hucklow, BUXTON, Derbyshire, SK17 8RG



Underground Britain: Legal and Insurance issues
by David Judson.

A short reference work that outlines the laws affecting cavers and mine explorers.

ISBN 0 900265 26 4

This is a short reference work that outlines the laws affecting cavers and mine explorers - for example, the principles of land ownership and access to land and over it. On legal issues, the booklet covers the situation in England and Wales - the law in Scotland is different and is not covered in any detail. For insurance issues, the whole of the British Isles is considered. There are appendices listing the relevant legislation, books and reference materials, and contact addresses for governmental, institutional and other organisations likely to be useful in seeking out more specific or detailed information. If you share the responsibilities of running a caving club or mining history society it is sensible to gain an understanding of legal and insurance terms, and to know what you should and what you should not be doing.

Regional Groups

In October 2004 a discussion began on the society's Internet mailing list about regional groups. The intention was that members in a particular area would be able to get in touch with each other and arrange informal local meetings.

The idea quickly caught on, and the committee approved it in November. Several members have already volunteered to organise groups in their own areas. They are shown in the table below.

The map shows the intended geographical scope of each group. The boundaries are approximate, and should be interpreted as a guideline rather than a strict rule.

Creating a new group

A regional group exists where members choose to create one. All it needs is someone willing to act as the 'Regional Organiser' and a handful of members to join in and play. Groups can be any size and shape, and are not obliged to fit county boundaries. Some areas will have too few members to support any group, while in other areas two or more groups may overlap.

Anyone interested in starting a group should contact Richard Lamont, who is assisting the committee by wearing a 'Regional Groups Coordinator' hat, by email (richard@lamont.me.uk).

If you are unable to use email then please contact the Secretary, Roger Starling, by post or telephone and he will pass the message on. (4 Maple Close, Sandford, Wareham, Dorset, BH20 7QD. Tel: 01929 553822)

Joining an existing group

If you would like to join a group then please get in touch with its Regional Organiser. (Some of them are only contactable by email. If you cannot use email then please contact Roger Starling as above.)
Members can join more than one group. They don't have to live in the area.

Mailing lists

Some of the groups have their own Internet mailing list. See http://www.subbrit.org.uk/mailman/listinfo for an up-to-date list. (Please only use these to discuss matters specific to one group. Anything of wider interest should be discussed on the main mailing list.)

Regional Group	*Regional Organiser*	*Address*	*Telephone / Fax*	*Email*
Scotland	Sandy Forbes	(Email only)	(Email only)	Panther650@aol.com
North-West	Tim McAvoy	Worthington Lodge Chorley Road Standish Wigan WN1 2XN	Home: 01257 472248 Mobile: 07950 311334 Work: 01257 426129 Fax: 01257 423778	Apathamus@aol.com
West Midlands	Christine Turner	30 Old Ford Walk Stourport-on-Severn Worcs DY13 0DW	Mobile: 07881 702532 Work: 01562 512040	ct2ndinf@aol.com
East Anglia	David Farrant	8 Portland Green Newmarket Suffolk CB8 0NW	Tel: 01638 602248 Fax: 01638 602248	d.farrant@ntlworld.com
Bristol-50	Roger Gosling	51 Greenhill Road Alveston Bristol BS35 3NA	Home: 01454 883607 Work: 0117 979 5611	roger.gosling @blueyonder.co.uk
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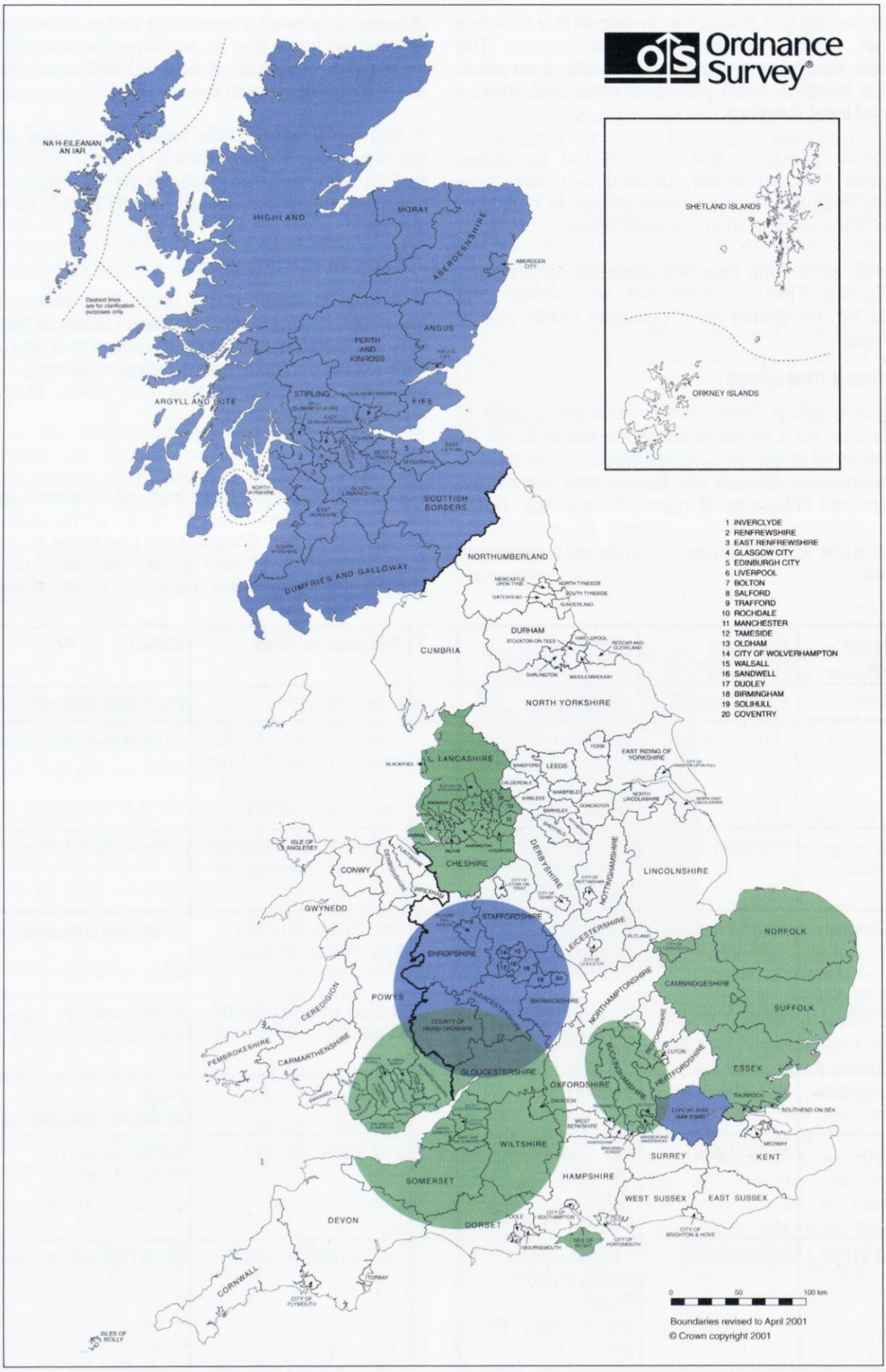
Regional Groups



Regional Groups

Reports from the Regional Organisers

Scotland

A slow start with only seven interested names spread over a geographical area of 15,000 square miles.

Whether the group continues depends on the response to this article. If you are interested please contact me *by email only*. Phones do *not* get answered if we're in the studio or on stage! [If you do not have email then please contact Roger Starling and he will pass the message to Sandy.]

At the moment any activities are impossible given the spread of members and the Scottish winter.

Sandy Forbes

East Anglia

So far we have 12 members of the East Anglia group. They come from all over the area, from Peterborough in the North, Ipswich to the East, down into Essex and myself more or less in the middle.

We are having some thoughts on where to hold our first meeting. It looks like it will be somewhere of interest. After all, why waste the opportunity to visit somewhere interesting as well as meet for a chat!

David Farrant

Bristol-50

Bristol-50 Group: anyone within 50-ish miles of Bristol, so covering roughly Bristol, Gloucestershire, Somerset, Wiltshire, and some of SE Wales. I have about six to eight people so far, so the group looks viable.

Roger Gosling

Buckinghamshire

We seem to be up to ten in Bucks and area - and that's without trying to contact any of the off-list folk. Next thing is to find the time and place to meet up.

Hugh Ainsley

London

Total of everybody interested [as at mid-November] is 41! Before anything is set up officially we will wait to hear from those not on the email list.

Keith Ward

Isle of Wight

The IoW group hosted its first sortie on 14th November 2004. A grand total of two members, plus one hopeful new member did the rounds. We had a good look at the old Black Watch Ack Ack site at Havenstreet, then moved on to a good look around the old Paddle steamer *PS Ryde Queen*. From there we visited an excellent ROC post at Long Lane, Newport which was in A1 condition and dry except for about an inch of rain water. We then went on to two sites at Ventnor. A full and varied day.

Due to our geographic situation, visiting the island is a pain in the neck, it is for that reason that I felt it necessary to float an island group. Our role differs from others in that we act as hosts rather than organizing tours and sorties for our group. To that end I would expect other group leaders to contact us, thereby saving ferry costs.

Barrie Davey

NAMHO 2005

NAMHO
National Association of Mining History Organisations

Sub Brit, along with Wealden Cave and Mine Society, Kent Underground Research Group and Chelsea Speleological Society, are hosting next year's national conference for the National Association of Mining History Organisations (NAMHO).

In a rare departure from its usual stomping grounds, in the mining heartlands of the British Isles, NAMHO is coming down to the south east. This makes the conference, which is largely site visit based, an ideal venue for any SB members in London and the Home Counties and indeed the whole of the UK, who want to learn more about local extractive industries.

A full schedule of site visits to nearly twenty abandoned mine workings and some underground military remains, is complemented by an equally comprehensive lecture series. It will be a packed weekend.

For full details, simply visit:
http://namho2005.wcms.org.uk/index.shtml

Or call 01737 243912

Or write to: 13 Beaufort Road, Reigate, RH2 9DQ.

RAF Chenies

RAF Chenies was an R8 Ground Control Intercept (GCI) radar station (code HAM) built in the 1950's as part of the post war ROTOR Programme. While most post war GCI stations utilised an existing WW2 site, Chenies was a green field site. Originally sited at Heathrow, it was known by this name until it was changed to Down Barns and on 5.9.1950 the name was changed again to Chenies.

Chenies was built as part of the first stage of the ROTOR Programme which was itself divided into four phases. Phase 1 was the re-establishment of 28 WW2 Chain Home radar tations. 13 were brought up to a fully operational state while the remaining 15 were brought up to a 'readiness' state. These stations would have required some notice before they were fully operational.

Phase 2 was the construction and installation of 14 new underground Centimetric Early Warning (CEW) and Chain Home Extra Low (CHEL) stations. Phase 3 was the construction and installation of 11 new underground GCI stations Phase 4 was the construction of 14 new semi-submerged or above ground GCI stations. These were generally (but not always) located on the west side of the country where the perceived threat of attack was not so great and to save on cost protected underground accommodation was therefore not provided.

Phase 4 comprised of five R6 semi submerged protected stations and nine less substantial R8 stations. Normally, stations on the east side of the country would be protected but Chenies being in the centre of the country was provided with a prefabricated SECO R8 structure built of wood fibre and asbestos panels. Of the nine R8's, Chenies was the only station to be fully operational, all the others were 'readiness'. The other R8 technical blocks were at Calvo, Charmy Down, Comberton, Gailes, Hartland Point, Scaranish, St. Anne's and Trewan Sands. Two further R8's were later built at Killard Point (Ballywooden/Bishopscourt) in Northern Ireland and Wick in Scotland as part of the Rotor 3 programme.

By 30.8.1953 the first two phases of the ROTOR programme were finished and Phase 3 buildings were complete with the installation well advanced. By this date the fourteen Phase 4 technical blocks which comprised five semi-sunken R6 structures and nine prefabricated R8 structures were nearing completion with technical installation expected to be finished by early 1954.

RAF Chenies had no married quarters or domestic camp with personnel being billeted at three of the dispersed sites of RAF Bovingdon, two miles north of Chenies from where they were bussed in daily.

RAF Chenies - R8 Buildings in a dilapidated state October 2004

The following radars were originally planned for Chenies: one Type 14 Mk. VIII, one Type 14 Mk. IX, two Type 13 Mk. VI, one Type 13 Mk. VII, one AN/FPS3 and one AN/TPS10. (No Type 80 was planned or built at Chenies).

It is unclear when Chenies came became operational but in 1954 '163 Signals Unit, Chenies' replaced the Fighter Command Control Unit at Heathrow, It is clear the station was not completely ready at this time as a temporary Type B operations hut was required for the AN/FPS3 radar.

RAF Chenies

The ROTOR station at Chenies was however short lived closing as a radar station prior to 'The 1958 Plan', the successor to the Rotor Plan. In 1959 Chenies was awaiting disposal but along with RAF Bovingdon it was selected as an ideal site for the construction of underground silos for the Blue Streak missile programme. Disposal proceedings were immediately stopped but the project was later cancelled due to its apparent lack of credibility as a deterrent

The station remained in RAF hand however becoming a Strike Command communications facility. In the mid 1980's Chenies also took on a new role as part of the Gandalf Project when a new radar was installed for the Met Office. The new radar is one of a network of Met. Office C band radars, situated north-west of London. It provides high-resolution (2 km Cartesian grid, 5 minutes time interval) estimates of precipitation intensity and extent over the south-east of England and is partly funded by the Environment Agency.

The two level operations room. Wooden steps lead up to the tote gallery

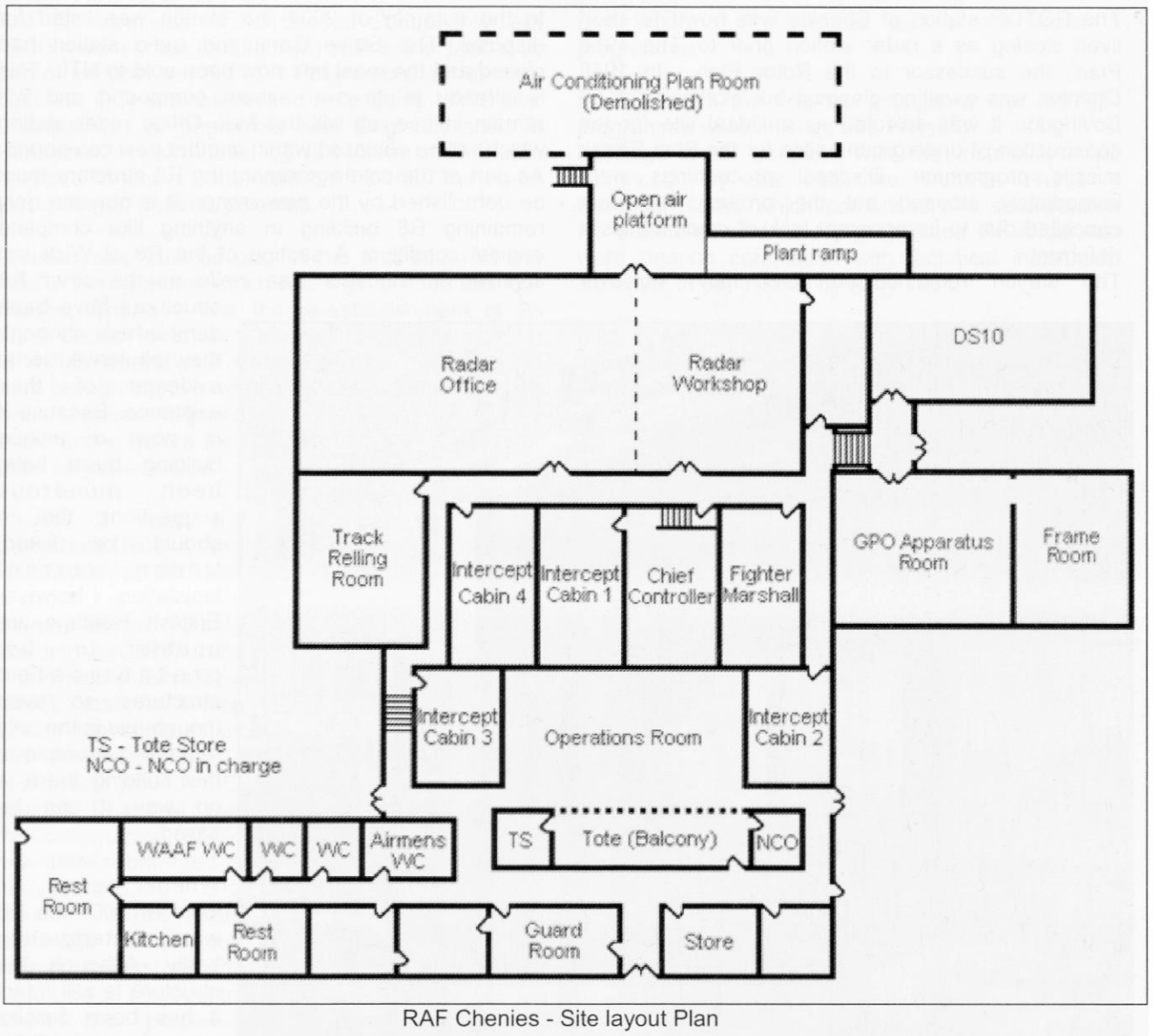
The R8 building has been redundant for many years. It was last used in the mid 1990's as a sports facility for the RAF with the two level operations room adapted as a games hall.

In the summer of 2004 the station was listed for disposal. The Strike Command radio station had closed and the mast has now been sold to NTL. This is already in its own secure compound and will remain in use, as will the Met. Office radar station which will be enclosed within another new compound. As part of the sale agreement the R8 structure must be demolished by the new owner. It is now the only remaining R8 building in anything like complete original condition. A section of the R8 at Wick still survives in industrial use while all the other R8 structures have been demolished although they all leave some evidence of their existence. Because it is now a unique building there have been numerous suggestions that it should be listed. Under current legislation however English Heritage are unable to list prefabricated structures so even though this is the only remaining example of this building there is no way it can be saved.

When visited in October 2004 the R8 was deteriorating badly. Although the structure is still intact it has been derelict since the mid 1990's and has been subjected to ongoing vandalism over many years. All the entrance doors have been boarded up but a number of holes have been knocked through the outer walls to gain access to the inside of the building. As fast as the holes in the wall have been boarded over by the RAF a new one appears.

The main entrance into the structure is on the north side which gives access into one of two spine corridors. Above the door there was a grey rotor sign saying 'Main Entrance for all ranks' (This has been recovered to RAF Holmpton). At one end of the corridor are the domestic rooms with a small kitchen with serving hatches into the RAF & WRAF rest rooms. The male and female toilets on the opposite side of the corridor are all intact although the WC pans have been filled with sand.

RAF Chenies



RAF Chenies - Site layout Plan

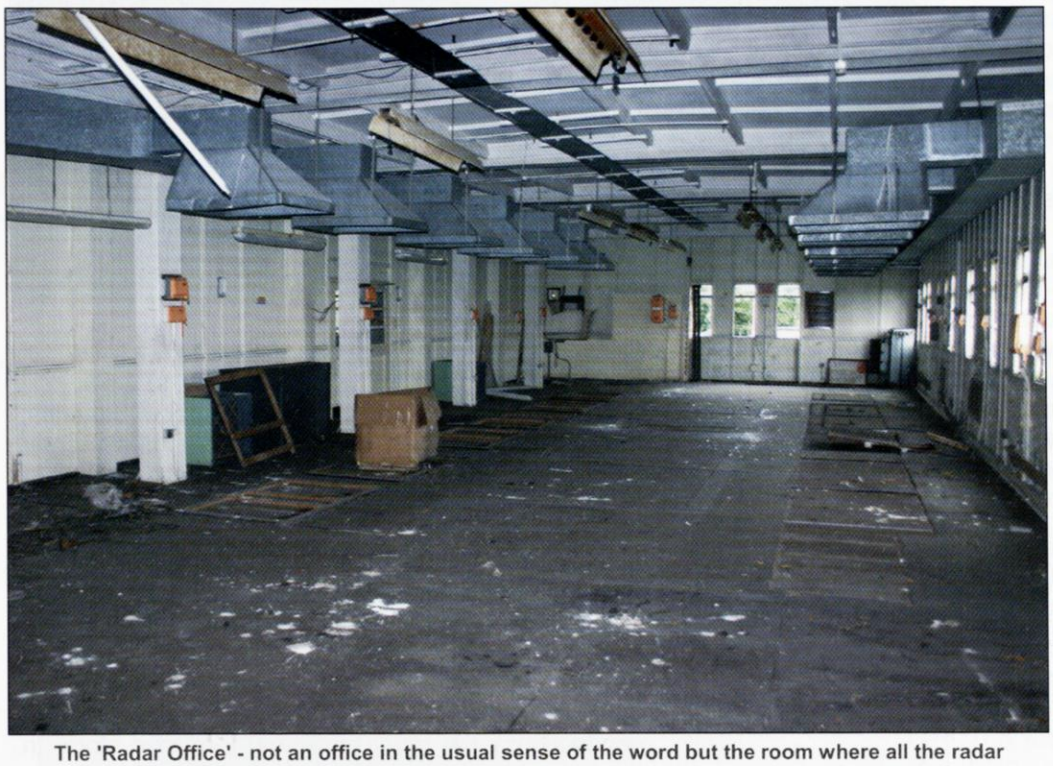
The two level operations room is also accessed from this corridor. Wooden steps lead up to the tote gallery, the metal Mission Tote panels (showing Anti Aircraft state, weather conditions etc) were all still intact at the time of our visit but have now been dismantled for reassembly in the ops. room at RAF Holmpton (Museum) in Yorkshire. The operations room was originally overlooked by the four intercept cabins and the chief controller's cabin. All these cabins originally had sloping glass windows but the three windows at the back were removed and bricked up when the ops. room was converted into a sports hall. The two side windows (Intercept Cabin 2 & 3) are still there but the glass has been painted over.

Half way along the spine corridor stairs lead up to a second spine corridor in the raised section of the building. From here there is access to the intercept cabins, chief controller's cabin and fighter marshal's cabin, all of which are empty. There are further steps into the chief controller's cabin. On the opposite side of this corridor is the largest room in the bunker, the radar workshop and radar office. This is where all the radar equipment cabinets would have been housed. The position of the equipment racks is still clearly visible on the floor and the metal trunking for cooling the equipment is still suspended from the ceiling. A small cooling fan is still in place at one end of the room alongside a window into the adjacent room which has a raised wood dais and a small electrical cabinet on the wall. On the far side of the room there are double doors leading out to an open air raised platform with a concrete ramp and stairs. This was used for bringing heavy equipment into the building. A now demolished ventilation plant room was sited against this platform and its concrete base is still visible.

RAF Chenies

At the end of the upper level corridor stairs lead down to the rear entrance and three further rooms. One of these housed further radar equipment and the other two were the GPO apparatus room which has a tiled floor and the frame room with some electrical switchgear and part of the main distribution frame (MDF) still in place.

Several brick buildings are still standing around the R8. These include the sub station, high frequency switch house, standby set house with fuel compound, sewage ejectors, water tank and pump house. Most of these buildings still have their grey ROTOR signs screwed to the wall. A now demolished SECO guardhouse would have stood just inside the main gate although there is no evidence of it now. There is also no sign of dog kennels that are normally found at ROTOR stations.



The 'Radar Office' - not an office in the usual sense of the word but the room where all the radar equipment was mounted. Note the two lines of extractor hoods over the equipment racks.

The standby set house still contains a large diesel generator, small fuel tank, switchgear and a large floor standing electrical control cabinet. The double doors have been ripped off the building by vandals and it is open to the elements. The high frequency switch house is divided into three rooms each accessed through external doors. The two end rooms were open and one of these still contains a large mains transformer. The sub station was locked and is still in use providing power for the NTL mast and the Met Office radar. A small modern brick building at one end of the R8 housed the radio equipment for the Strike Command communications facility but the building is now empty and NTL's radio equipment is now housed in a smaller newer building close to the base of the mast within a compound.

Close to the Met. Office radar station there is a square building, obviously from the ROTOR period and alongside it the truncated base for the AN/FPS3 radar gantry. This building was almost certainly the AN/FPS3 equipment room.

5 radar plinths are to be found in the surrounding fields, these would have been for the Type 13 and Type 14 radars. Four of the plinths would have had the radar mounted on the roof; these have an octagonal hole in the roof where the radar was mounted. The fifth plinth has a solid concrete roof. The radar here would have been mounted on a 25' gantry alongside. Close by there are four concrete bases for an aerial tower, it is unclear what this was for but it probably belongs to a later period. A number of other mast guying blocks are scattered around the site, these two probably belong to a later use for the site.

To the south of the R8 there is a grassed mound with stairs going up to this. This is the sewage tank for the station.

Sources:

PRO files:

Air 8/1630
Air 2/10984
Air 8/2032 Appendix C
Air2/11178
Air 2/7377 (Blue Streak Works 1959-60)

Bob Jenner
Dr. James Fox

Photos and text from Nick Catford

Stockport Protected Repeater Station

Stockport (Manchester/G) Protected Repeater Station (type PR1)

WHAT: Known to BT as Stockport TRS (telephone repeater station) or Manchester/G, this building is one of the handful of protected repeater stations (the term 'protected' is explained later) constructed during the Cold War period. Although it is still in use as a functioning BT building, the company kindly allowed a visit for study and photography purposes.

Only the ventilation grilles in this rear view of the station give any clue as to the apparatus within.

Lyndon Green was known technically as a PR1 (protected repeater station, type 1), comprising a two-level bunker with heavy blast doors. Similar to other PR1 stations, it is semi-sunken, with the main distribution frame and active equipment on the ground floor and power plant and ventilation system in the basement below ground.

WHERE: Although the address of the repeater station is always given as Hempshaw Lane, it is in fact down a side road just south of that highway. The cables that feed it run down the main A6 trunk road nearby and this location is probably the closest that could be found without demolishing existing property. A BT office block (now empty) stands next to the repeater station and the repeater station itself is normally unmanned.

ITS FUNCTION: Repeater stations were locations where the signals on telephone cables were amplified to counteract the electrical losses that tend to make speech fainter. The majority of repeater stations were located at intermediate places between telephone exchanges. Stockport is on one of the main trunk telephone (and television) cable routes between London and Manchester, having a number of important circuits passing through it. The station also lay on a secure transatlantic feeder route connecting Kingsway exchange in London with a high capacity TAT7 Transatlantic Cable terminating at Oban, Scotland. This carried the 'Hot Line' teleprinter linking Moscow and Washington during the Cold War.

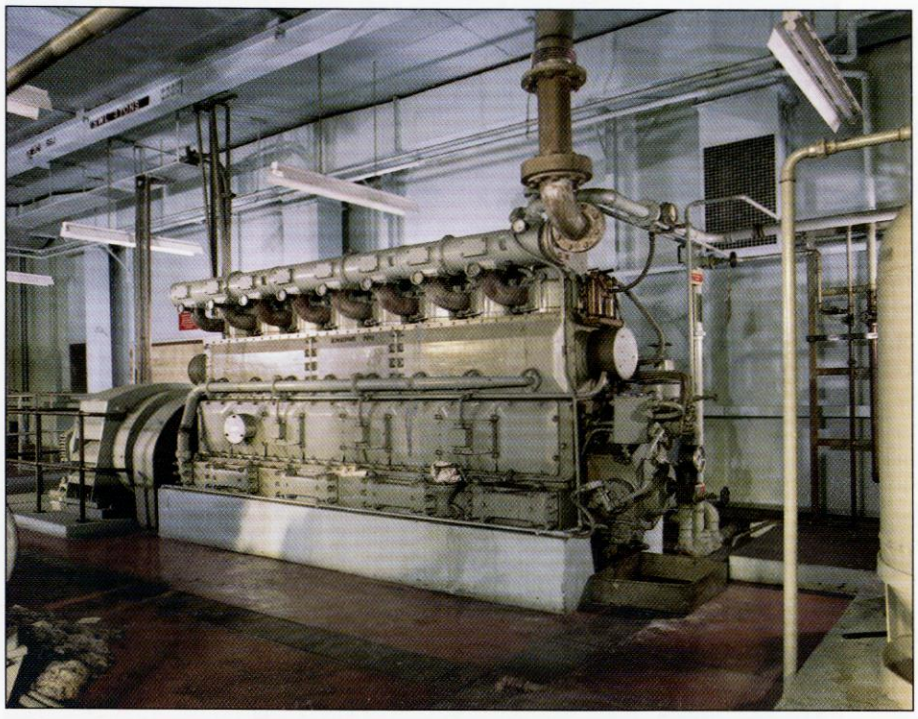
It was constructed at a time when all repeaters (amplifiers) used thermionic valves (vacuum tubes), which required far more electrical power than the solid-state amplifiers of today. Accordingly the repeater station had a substantial power plant, with its own electricity substation, a large generator (removed some years ago) and storage batteries. The station had equipment stores, a test desk, repair workshop and eating/recreation facilities.

Several operational circuits still run through the place, although the workshop is no longer active. Features noted on the ground floor included the Battery Room, the Main Distribution Frame, amplifier racks, the 'service PBX' (manual telephone switchboard serving the location, equipped with standard exchange lines and a number of Trunk Sub connections), the repair area and the valve store. In the basement were the High Voltage substation, the cable chamber (where underground cables entered the building) and a large room that had once housed the generators and the air extraction plant.

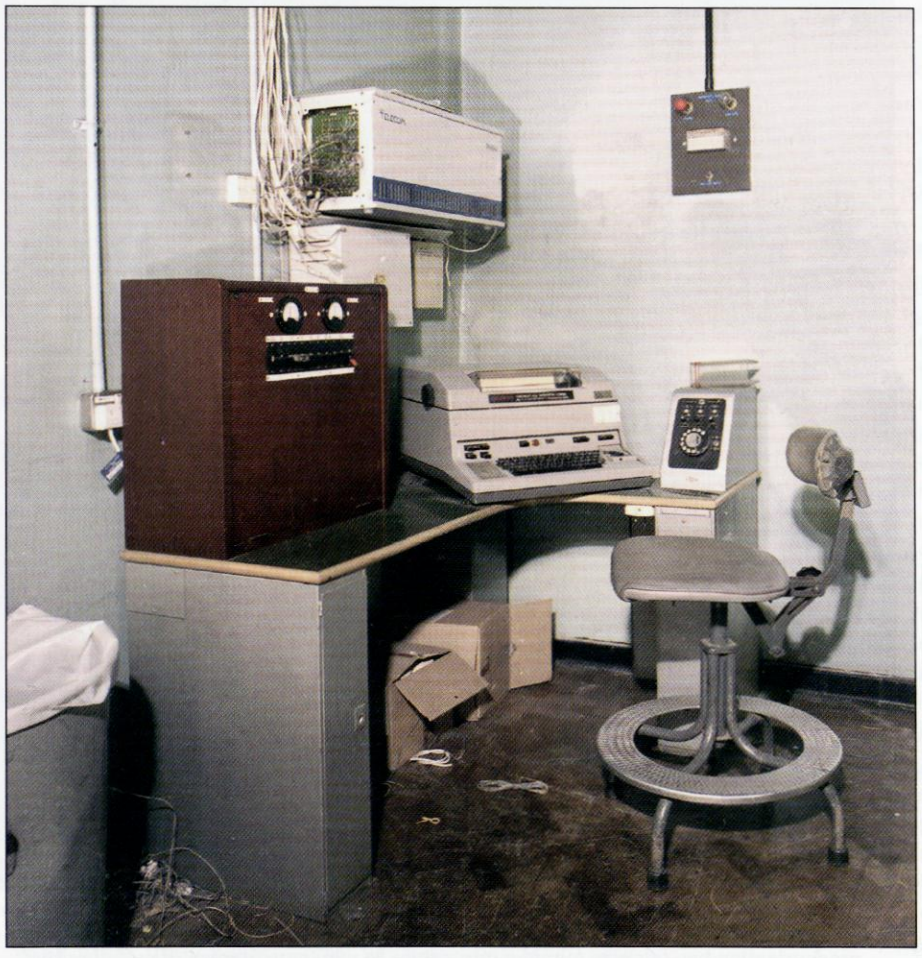
HISTORY AND BACKGROUND: The facility was opened in 1953 and on account of its strategic importance it had a low profile. Its nondescript appearance gave no clue to what lay behind the locked gate, although passers-by could have deduced its telecomms connections from the sign on the wall or the vehicles parked in the yard. Few people could have known that this building had been built at great expense to maintain communications through Manchester in the event of atomic war.
Stockport was one of a number of repeater stations built between 1951 and 1956 as a result of a Treasury paper entitled United Kingdom Telecommunications in War Published in 1949.

This recommended that some £2¾ million be spent over five to six years on a scheme for strengthening the telecomms facilities needed for defending the

Stockport Protected Repeater Station



This generator is probably fully functional.



Teleprinter desk with dial unit and test cabinet. All important repeater stations and exchanges had telex connections.

country. One element of the Post Office defence programme (as this become known) was a continuous protected cable tunnel running from Stockport in the south, through Manchester, Salford and the deep-level trunk exchange called Manchester Guardian, and on northwards to Pendleton telephone exchange (and reputedly to Swinton, another protected repeater station). In the event the tunnels to Stockport and Swinton were not built and the northern and southern termini of the tunnel were Pendleton and Ardwick respectively.

Protected in this context means that the buildings and other features would be sufficiently robust to remain intact if a single atomic bomb fell on the centre of Manchester.

Hardened or 'protected' repeater stations erected in Stockport (Manchester/G), on the A6 south-east of Manchester, and in Swinton (Manchester/F) to the north-west. Both of these were Type 1 stations (Type 2 was larger). The total number of PR1 and PR2 stations constructed around Britain is usually given as eight but it is becoming clear that a greater number were in fact built (details will be given in a subsequent article).

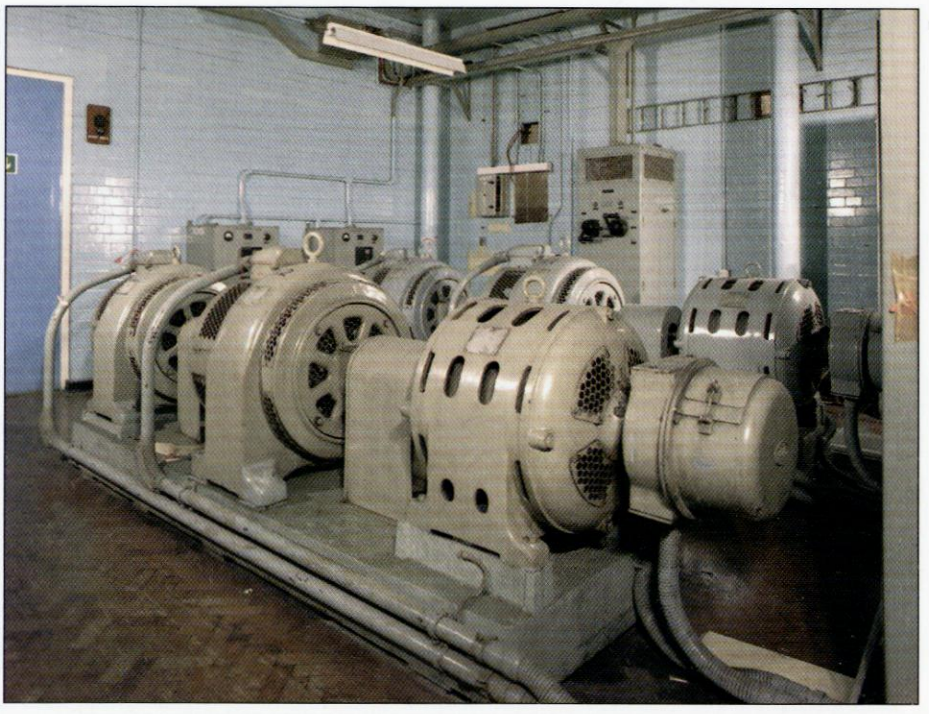
The suffix letters were used simply to identify specific repeater stations in the Manchester Telephone Area (for example Manchester/A was Dial House, Salford, a major television cable terminal serving the BBC and Granada Television nearby). Alternative, shorter designations used the two-letter telegraphic code for Manchester (MR), making Stockport MR/G and people who worked there say there was in fact much confusion

Stockport Protected Repeater Station

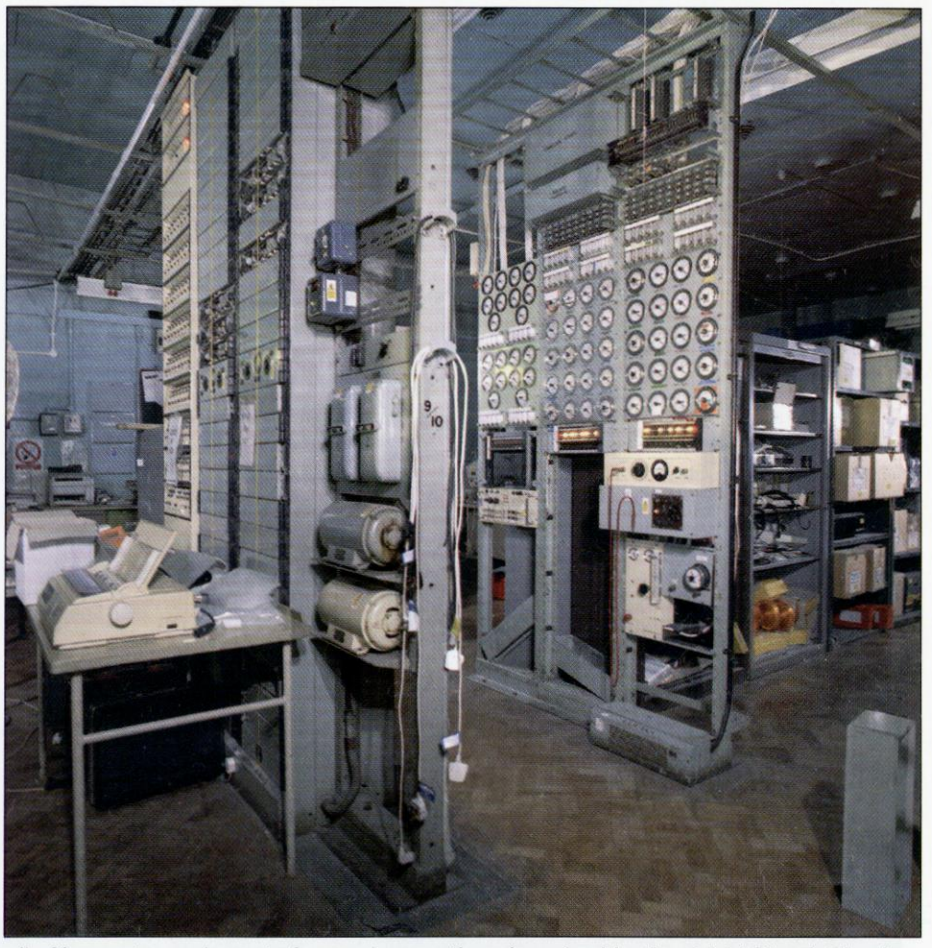
between MR/G (Stockport) and MR/GU (Guardian).

The first repeater (long distance) equipment was installed in Stockport Telephone Exchange, and this was designated Stockport/A TRS (Transmission Repeater Station). When the PR station was built at Hempshaw Lane, this was initially designated Stockport/B TRS, then later changed to Manchester/G.

Someone who worked there related: "There was a lot of folklore about working in these underground stations. I doubt whether it has been documented. In the late 1950s and 60s when I worked in these stations, most Post Office staff had no idea what was going on, and there was an air of secrecy and mystery about them. There was also friendly rivalry between 'switching men' and 'transmission men'. Usually transmission staff were chosen from the cream of switching men. So transmission men felt a little special. I was told in the early days of transmission that the technicians used to wear corduroy trousers, tweed caps, and smoked pipes. It was a sort of cultural uniform. Most Post Office Vans had an identifying letter, e.g. M = Maintenance, F = Fitting, E = External Plant and D = Design and Estimate, but the transmission staff had LD = Long Distance, which we always felt was special. These PR stations were very eerie places to visit at night on emergency call-outs. The ventilation plant ran continuously, and the no-break power generators. So, there was a sort of droning, rumbling sound. I imagine, as if in a submarine. The equipment racks would emit strange noises, squeaks, and clicks, which in the daytime, with other staff around, were insignificant.



Motor Generators



(Left) repeater equipment of several generations (grey is older than Light Straw). Circular devices are probably tone generators for signalling. (Centre of picture) cable pressurisation bay (air was pumped into cables to eliminate ingress of moisture that would damage them).

Stockport Protected Repeater Station

Most of the transmission apparatus is analogue solid-state repeaters (amplifiers) in Type 62 equipment practice (equipment shelves are angled inwards to allow deeper rack chassis)

But if you were alone in the middle of the night these sounds and the general environment could make your hair stand on end."

How Stockport and the rest of the telephone network were intended to function under atomic war conditions is a matter for speculation, since the Post Office war instructions of the time are not available for inspection. One might imagine that the network would eventually shrink down to the switchboards of the emergency manual switching system (EMSS) and the small number of 'Trunk Sub' subscribers connected to them (and to the normal manual switchboards above ground). Once electricity from the grid was lost, exchanges would keep going for a while using their batteries and emergency generators. The bulk of the public telephone network would have been disconnected altogether previously and it is possible that the automatic trunk exchanges would provide connection between EMSS locations. This, however, is only speculation.

MANCHESTER GUARDIAN: Stockport repeater station was closely bound up with its 'parent' facility at Manchester Guardian, which has its own website at http://www.cybertrn.demon.co.uk/guardian/

Our informant continues: "Manchester/Guardian Repeater station had a notorious reputation. Because it was underground young people did not want to work there (they would rather work in a place like Dial House, where there was a pleasant canteen frequented by 600 female operators etc.!). In the winter you entered in the darkness, and came out in the darkness. It really was an eerie place. You descended a long flight of twisting metal steps, to an elevator, which then descended at least a 100ft, then walked a very long corridor to the main 'tube' area. The walls were curved, so you could see clearly that you were in side a tubular tunnel. It took between 15 and 20 minutes to get from the entrance in George Street (the lobby of the old Central Telephone Exchange) down to the repeater station. We were allocated 15 minutes travelling time from the entrance to the work floor. So, most people didn't bother to go outside for lunch because of the time to taken to get out of the building and back again. It was a very claustrophobic place, rather like a dungeon. Some people felt that it was a punishment to be assigned to work there. The most impressive aspect of Guardian to me was the feeling of total reliance on the power staff to pump the air down, and keep the water out, and keep the power flowing. You really felt that you were vulnerable should something fail. It was difficult to see how you could get out. I had the utmost admiration for the Power staff. There were a lot of them. I believe there were about 20 men present on each shift, and they had 24 rota staffing. At the core they maintained three huge electricity generators and a huge ventilation plants, pumps etc. They were constantly inspecting the tunnels for leaks, and there were plenty of them. I believe that if they had stopped pumping, eventually the place would have become flooded. The PO and later BT picked up the tab for these running costs, which must have been tremendous."

Our thanks are offered to the BT for making this visit possible. Those taking part were Nick Catford, Robin Cherry, Bob Clary, Andrew Emmerson and Richard Lamont.

The 8 protected repeater stations are:

PR1Portsmouth, PR1Stockport, PR1Swinton PR1Lyndon Green, PR1 Queslett, PR1 Uddingston PR2 Rothwell Haigh ,PR2 Warmley (Demolished 2001)

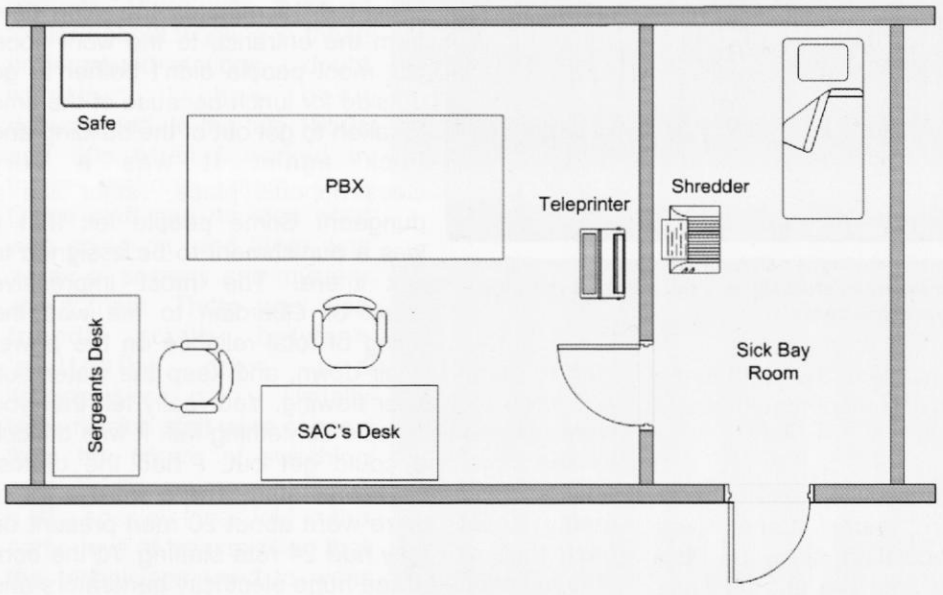
RSG site visit 27th September 2004

By Andy Emmerson

Bawdsey - 1987

In 1987 I was serving at RAF Wattisham as a Telecommunications Operator. This trade combined the old trades of telephonist (switchboard work) with Teleprinter Operator. We were also trained on radio and field equipment. However, I'd only worked in Commcens (Communication Centres) and not PBXs to date. The equipment at Wattisham was all new and modern and a brand-new building with relay links to Boddington and Lindholme.

At the time, Bawdsey was stand-by strike command for High Wycombe in communications terms. It had a large commcen on the lower level of the hole which was kept in readiness but the links to Boddington and Lindholme were not actually kept up and running.



"To help describe the working room, I've done this little sketch to help you envisage what it was like. You will see that there wasn't much space "

Communications were done via TAS (telegragh automatic switching system) from Wattisham. However, we had to be careful to only send up to classification RESTRICTED on this link (You'll see why I'm mentioning this later). Anything higher had to be encrypted.

At Wattisham we had a roster board and I saw the name Bawdsey. I have to admit I hadn't heard of the place before and was told about its history. The comms people there consisted of one permanent sergeant and an SAC (senior aircraftsman/woman) from Wattisham on detachment. Some apparently didn't get on with the sergeant over there which could be an issue given the size of the room to work in.

My first glimpse of Bawdsey was at night when I took friend over there on a motorbike. I saw the technical site lit up like a Christmas tree but went straight past to the manor. I dropped him off and headed back along the dark roads.

My turn eventually came and I was detached over. My personal belongings were shipped over in a Sherpa van and I took the motorbike. I didn't actually live in the Manor itself but a purpose built block nearby which was more comfortable. I shared a room with three others and had a fair amount of space in a corner of the room given privacy by the location of the lockers. I could even see the estuary from my window. When first detached, the previous bloke stops on a couple of days to show you the ropes. My mate was John, we had breakfast in the Manor (in an oak panelled dining room overlooking the sea!) and made our way to the technical site. It was quite a walk through the grounds and came out near the little cottage on the corner. If you were really luck you got a lift of someone but that was rare.

So, we walked up the small bit of road to the wire gate, which was locked and controlled by an intercom. I could hear the dogs of the RAF Police barking away. The gate was unlocked remotely and we walked into the bungalow guardroom.

Once inside the door I was introduced and handed over my 1250 (Id card) in exchange for another pass. Moving to our right we went through a turnstile. Once through we descended the stairs and along the corridor.

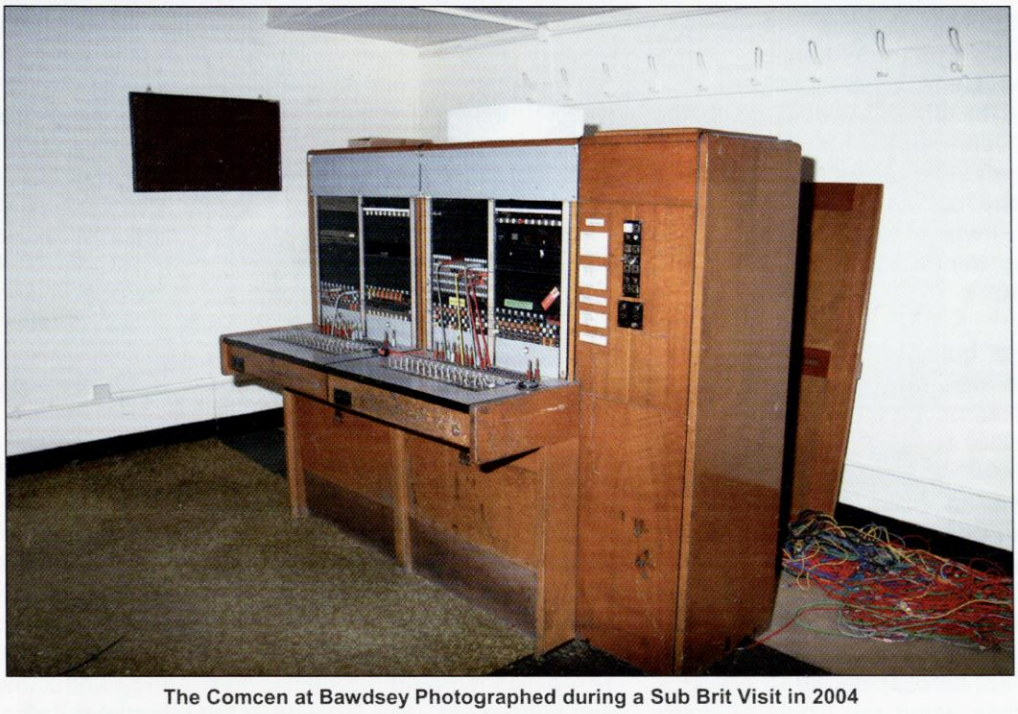
I remember once commenting to my corporal on how safe this place would be in the event of a nuclear attack. He said it probably wouldn't be safe under conventional attack!

At the end of the corridor we reached a door to the sick bay. John had the key from the police above, which he'd signed out. To enter the PBX you had to go through the sick bay. To give us a little bit more space, we used the keep the PBX door open and lock the outer sick bay door. All commcens and PBXs had to be kept locked and secure with very restricted access. We used the sick bay bed to put our coats on and later my crash helmet and bag.

Then into the PBX. It was tiny ! You can see from the diagram that it was very cramped. Really it was cramped for two people but on handover there were

Bawdsey - 1987

three. The sergeant hadn't turned up yet so John started showing me round. The teleprinter was of the old design (type 86 – can't remember) with a large acoustic hood on. There was paper and tape everywhere from the overnight traffic from Wattisham. Oh yes, we only manned this place during the day.



The Comcen at Bawdsey Photographed during a Sub Brit Visit in 2004

We opened the safe and got out the equipment and paperwork for the SAC's desk. This was used for processing all the incoming and outgoing teleprinter traffic. Once done, we phoned the police in the guard room upstairs and said we taking over the PBX. During the night the PBX was switched across to a small version in the guard room upstairs and the RAF Police took care of calls.

The PBX was the old sort with jack plugs and long wires. Above the PBX was a large whiteboard with names and extension details on.
We removed the paper and tape and booked in all the traffic – this bit I was familiar with. The tape was 5 unit Murray code and was required for any encryption/decryption purposes.

I wasn't really looking forward to operating the PBX but had some refresher training over at Watttisham.
The sergeant turned up and we were introduced. He seemed an okay sort of bloke.

At lunch the sarge took over and off we went. We were given 1.5 hours for lunch due to the long walk. However, if we got a lift it wasn't' a bad number. We also finished work about 15:30 to 16:00.

After the handover period, John went back to Wattisham and it was just the sarge and I on duty. John left his cassette player and some tapes as he said it gets a bit quiet in the PBX. The sarge was okay with this as long as we turned it down when dealing with calls. I was also allowed to smoke in there. Being a non-smoker now I realise it must have been like a real tap-room. I'd dealt with a few calls by now with John and the Sarge listening in and I got the hang of it. In between I would process some signals but there were not that many. There was a fair bit of paper work to do on the desk behind me too.

As I got okay with the job, I started seeing less of the sarge. He had lots to do elsewhere and was a keen squash player. Now started my long hours alone in that tiny little room !!!
I got to go out of the room now and then to get a coffee or toilet break but mostly I was in there.
I did get very bored and started to read a lot and John's cassettes got some real hammering. However, you can only listen to War of the Worlds so many times.
I dreaded getting a 222 call however. This was the equivalent of the civilian 999. There were standing orders for handling such calls so I had read them many times.
One day the buzzer and lights lit up on the PBX – it was a live 222 !!! Oh no (or words to that effect) came to mind. I took the call.
There was a fire in one of the huts above ground near the Bloodhound missiles. I went into auto mode and started on the callout list. RAF fire crew on camp, civilian fire crew, local police, station commander, etc etc, etc. I can't remember all the order. Whilst I was doing this I was on my own in the PBX and I heard over the loudspeakers that everyone else was evacuating. Others started to ring 222 and I was losing my rag by this time. (I'm sure I said I'm dealing with it ! in a curt manner to some people).
Eventually I got a call saying the RAF fire crew had dealt with it and to send a call to the civilian fire crews to not come – a stop call. I called them and they said they would attend anyway! I later found out firstly

Bawdsey - 1987

they charge for attending and secondly they were dead nosey and like to have a good look round such a facility! One of my roommates was a fireman and he told me the fire was caused by a rabbit chewing through a 20,000 volt cable. The rabbits were quite prevalent there. There wasn't much left of it or the hut.

Other idle moments had me planning what to do in the evenings. The NAAFI was pretty boring. I did go bowling the American camp at Bentwaters on a Friday sometimes and at others I would go to the Swan Inn nearby with John the fireman. Else, I used to zip round on the motorbike looking at the WWII legacy buildings nearby or walking on the beach along from the manor. I was warned not to pick any strange object up as things such as mines get washed up in that area.

Some phonecalls were quite amusing. There was one officer's wife who was never out of touch for more than hour! She was quite curt herself and I did pity the officer on the other end!

One day a call came in from an American at Bentwaters. He was an officer and wanted to attack Bawdsey! It soon dawned on me that he meant a mock attack to test radar etc. I was very tempted to give him the go-ahead but after a brief conversation I said it was best to speak to the station commander. However, others were not so considerate. A previous SAC remembered a time when the whole complex shook. They thought it was an attack or earthquake. What had happened was the navy and coastguard blowing up an old mine out at sea. Normally they would warn us but forgot to on this occasion. I did see such an operation once during lunch-time so it was very entertaining.

The road tax had run out on my motorbike and I hadn't got round to getting it renewed. However, one the RAF Policeman had noticed this and pointed out in no uncertain terms that I had to get this sorted or be charged. There was no arguing though I tried. He was rather unpleasant it too. One day came where I could be just as smug. When we handed over the switchboard at night we made a note of a counter, which recorded how many minutes were spent on outside lines. This was used to for charging personal calls to senior NCOs and Officers via their mess bills. Ranks below were NOT allowed to make personal calls.

The counter was checked every morning and cross-checked with the private calls logged by the police over night. One morning there was quite a few units unaccounted for. I tried not to appear smug as I pointed this out the RAF Police and that it was a serious offence to make personal calls etc. They became quite pally after that funnily enough! However, many people did get free calls by being nice to the PBX operator though I can't admit to that!
Another event I was not looking forward to was an exercise. It wasn't so much the work itself but having to run all the way to work in uniform! One night the sirens went off about 20:00. We all dashed into uniform – I was in my room at the time luckily enough. I did consider running for work but opted for the motorbike instead. I rode as far as I could through the grounds and left bike near the little cottage on the corner and ran the rest. Once in I got control of the PBX I changed into my combat gear. Within an hour my sarge had arrived and things got busy. He decided to split the work and said I could get some sleep in the commcen downstairs. After all, it was not operational and nice and quiet. I got my head down and was later woken by my sarge with a nice cuppa. I have to say that I always got on with him. Others didn't but I found he was quite fair and not many SACs get woken by their sarge with a cuppa!

The exercise went on till the next day. My sarge left early and I carried on till home time.

I mentioned near the beginning about the paper tape that was necessary for encryption/decryption. Well, now and then someone at Wattisham would forget to encrypt and send across stuff above RESTRICTED. The police did patrol at night and we fairly well knew that they would have a nosey at the teleprinter traffic. So, if someone at Wattisham made the mistake, and we all did, we had to get hold of the Bawdsey colleague and ask him or her to get over to the PBX pronto and lock away the traffic we had sent. I had to call John in the past and sure enough I was called out of the bar at night with the same problem. It was an easily fixed problem but very annoying at having to run 1.5 miles to work because someone had cocked something up.

Looking back I think the confined space of the PBX and lack of people did have some effect. It did grind on the nerves and I think its why I wanted to be outdoors during the evenings. However, you did get used to it on the whole and I could always make the odd phone call to a colleague for a bit of company. Most of the time it was normal work so the odd event did liven things up a bit.

I hope this gives you some insight as to what it was like.

From Craig.

(Craig, sorry I have mislaid your second name! - Ed)

Subterranea Britannica's 30th Anniversary Meeting

Subterranea Britannica's 30th Anniversary Meeting at Reigate, 18th September 2004

Subterranea Britannica, founded by Sylvia Beamon at Cambridge in 1974, celebrated its 30th anniversary at Reigate on Saturday 18th September 2004.

The purpose of the meeting was, in addition to simply celebrating the anniversary, to thank Sylvia Beamon and Barbara and Malcolm Tadd, and all the other Honorary Members, for all their work for the Society and for their contributions to the archaeology and history of man-made underground spaces.

Five of the Society's six honorary members, Chris Bayley, Sylvia Beamon, Professor Tim Shaw (President), and Barbara and Malcolm Tadd attended. Harry Pearman (the most recently elected Honorary Member, sadly, was unable to attend on account of a prior engagement.

The full list of those who attended is Linda Bartlett (Committee), Chris and Cathy Bayley, Sylvia Beamon, MC Black (vice-chairman), John Burgess (Committee), Brian Clarke, John and Rosemary Collett, A.F. and S.G. Dawson, Martin Dixon (Committee), David Ferris, Father Gary Gill, Julia Milsom, J.W. Ridgeway, Prof. C.T. Shaw (President), Paul W. Sowan (Chair), Barbara and Malcolm Tadd, Terry Tracey, Ian Walker, and Stewart Wild.

The party met at the south portal of England's oldest surviving road tunnel, in Tunnel Road, Reigate, where Paul Sowan led a conducted tour of the tunnel, and the communicating Tunnel Road East and West sand mines.

Lunch was taken at a restaurant in Reigate High Street, and the meeting concluded with a continuation of the guided tour to view the Reigate Castle earthworks including the enigmatic 'Barons' Cave.' The weather on the day remained fine until the end of the tour.

From Paul Sowan

Labyrinth City Under Dedinje

The two guard soldiers -- Dragan Jakovljevic and Drazen Milovanovic -- and their tragic deaths, which caused a big stir in the public (and also among the political and particularly the military leaders of Serbia-Montenegro) has once again put in the spotlight the story about the big (underground) shelter at Topcider (Belgrade district) that the unfortunate youths had been guarding. This story has been told many times but it has never been completed.

The truth be told, this is not the first time that the media has talked about this facility. All sorts of stories, even some that were almost incredible, were told about it. The first -- very brief -- information about the facility was presented to the public after Josip Broz Tito's death on 4 May 1980. At the time there were those who claimed that the House of Flowers, in which Tito was buried, was linked by an underground canal to a special military shelter. It was claimed that the shelter was located in the immediate vicinity of the residence that accommodated "the son of all Yugoslav mothers." An entire theory was developed. According to this theory, in the event of a devastating military attack on Dedinje (another Belgrade district) and the surrounding areas (at the time it was still believed that Yugoslavia could get involved in a nuclear war), Tito's body would have been moved "by a single touch of a button" from its tomb to the shelter and thus preserved.

As we moved in time away from the date of Tito's death, this almost absurd story was rarely repeated. It was replaced however with a science fiction-style link between this shelter and not only Tito's residence, but the villas of other most important officials of former Yugoslavia.

This newspaper has obtained from several reliable sources, who wished to remain anonymous, an exclusive story about the famous shelter and warehouse. This is the first time in many decades that the truth about this story is presented.

"Such a facility does indeed exist. No one has ever wanted to talk about it since it is a state secret." This is how our informants, who insisted on anonymity, began their story. "If we exclude the people who worked directly on its maintenance, an extremely small number of people have had the opportunity to see this facility and become acquainted with it directly. Written records were strictly and precisely kept for each of these persons. What is quite interesting however is that a far greater number of people stood in front of the entrance to this facility, watched museum and other exhibits, and enjoyed a good meal and drink, completely unaware that only a couple of meters away from them, perhaps even at the place from which they were served food, was an elevator that could take them deep into the Earth's womb."

Thus, the entrance is located in Dedinje, not Topcider. This is the true location of this facility. The Topcider location is just the exit, which has also been skillfully masked. The exit houses an ordinary military equipment warehouse; the army has thousands of such warehouses.

No one knows what is hidden behind the walls of this military warehouse.

Journey to Center of Earth

This is just an above-ground section that masks the entrance and is open to the public. You can get to six underground floors via an elevator. The lowest level is several tens of meters below the ground.
It is quite vast and houses offices, rooms, and bedrooms. The offices are equipped in the same fashion as any ordinary above-ground office. Since the entire facility was supposed to accommodate members of the Supreme Command and the ancillary services, which were staffed by a large number of people, for several months, we can only speculate on the exact number of rooms and offices.

Labyrinth City Under Dedinje

Sketch of underground bunker

This area leads to a floor housing the communication centers and rooms used for storing equipment, food, heating oil, and water.

From this point you can get to a fascinatingly huge hall, which is the same size as the world's biggest subway stations. This is actually a seemingly endless tunnel in which a human being appears to be tiny. The whole area is lit perfectly. It is wide enough for trucks to drive through. As you move down this tunnel, you from time to time encounter extensions. They contain tracks for ventilation and other tubes. There are dozens and dozens of smaller roads leading to unknown destinations. Physically, it is impossible to tour everything, particularly because everything is operated at the touch of a button. And the door opens....

The facility has completely independent sources of power, water, and heating. The floors above the tunnel (that do not run in parallel with the entire length of the shelter), which are closer to the ground level, serve as a "safety zone" of sorts. They house additional ventilation equipment and air filters, water tanks, and anything else necessary in case of a nuclear attack.

Built in Stages

In order to avoid any possibility of someone revealing the actual location of the premises and the tunnel, as the shelter was a big secret, the structure was built in stages. The construction involved cleared construction companies and the army. No one, however, knew what they were building. Workers and contractors were often moved from one location to another, and were sometimes asked to do only a small part of the job they had been assigned. New teams arrived, and they would also come from some other location. After so many transfers no-one could even imagine what they were engaged in.
At one point, the army's top echelon, which kept a detailed record of everything, fit all of the pieces of the puzzle together: they finally built a true city underground.

The shelter is the deepest somewhere at its beginning. When you go underground, it is actually tremendously difficult to find your way through all of the rooms, hallways, and floors at the shelter itself, not to mention pinpointing what your location would be above the ground.

Time will certainly reveal and demystify the exact and precise coordinates of the tunnel. Most of the tunnel does run in a straight line, but there are some irregularities. For example, its deepest point is at the location where the living quarters and office premises are supposed to be. When you go up to the "subway tunnel" and keep walking up, after a long while you will actually get from the third underground floor directly to the ground, that is, the entrance.

This is understandable, as the already expensive construction process would have cost even more had there been an equal number of floors along the width and the length of the shelter. There was no need for this, either, because it was envisaged that the supreme commander and his colleagues would never go beyond "level 6" in case of an attack.

What also contributed to this was the geography of the underground terrain, which is why no one can precisely say where the three floors by the exit are "lost." As you move along the tunnel, you do not get the impression that it is going downhill or uphill.

Visitors Log

There were also stories that the construction began in the middle of 1980s. Our informants claim that this is not true. Unfortunately, no one can say with certainty when construction officially began. It can be said with a high degree of certainty, however, that the entire underground complex was built between 1960 and 1970. The scope and the specific nature of the entire project, as well as the phased construction, required a somewhat longer period of time for construction.

We could possibly get more precise information if we were able to obtain the visitors log. You had to have dozens of military seals of approval to be able to get a permit just to go down to the shelter. Seals were obtained at several military locations. Only with such documentation would someone get an opportunity to visit the premises. Depending on the military rank of the visitor, certain levels were off-limits.

A wide range of specific professions had to be involved to maintain so much machinery. All elements of the machinery had to be in operation at all times. For example, a communications engineer would only go as far as the sixth floor, where the communications center was located. He had no idea that there were more floors, not to mention knowing what was on them. Likewise, personnel in charge of maintaining the air filters were able to enter only the first three underground levels.

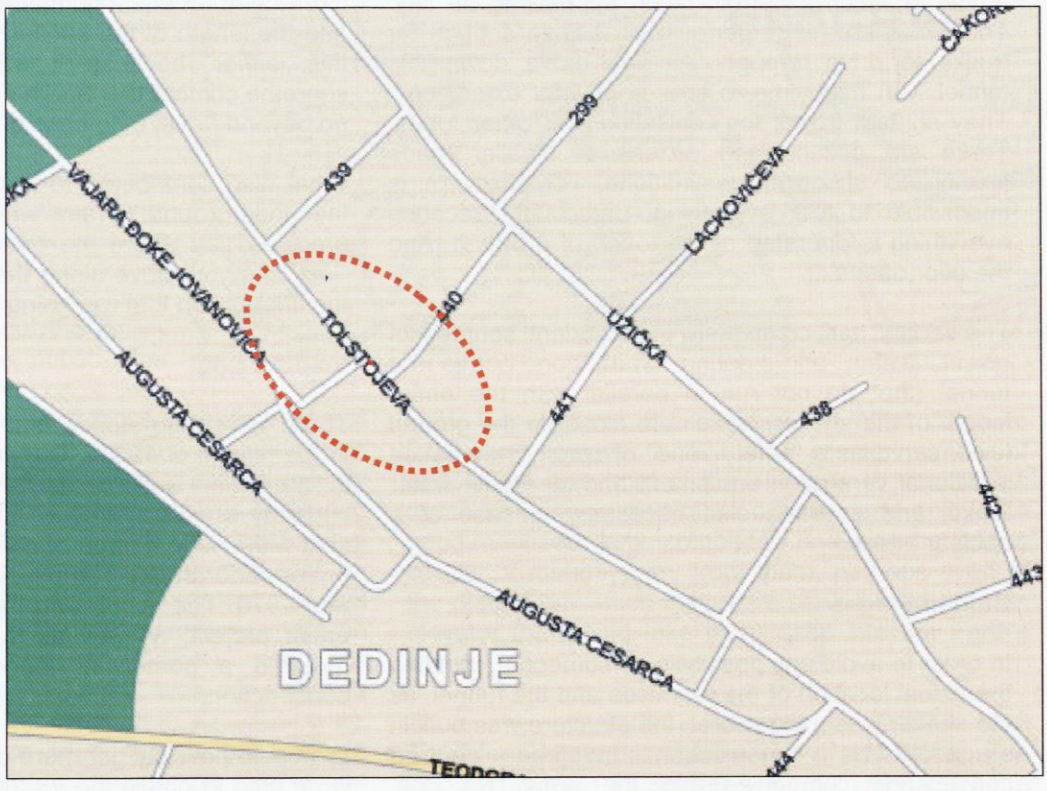
Although our informants only mention the entrance and the exit (but do not exclude the very likely possibility of other secret doors in this underground maze) and their locations, there certainly must be a

Labyrinth City Under Dedinje

myriad of other doors that were used by maintenance personnel. They simply were unaware of others.
Such a pattern has remained in effect to date and the members of the guard brigade also probably do not know what lies underneath. Our informants assume that neither Mrksic nor Colic, as the commanders of the brigade, knew this, not to mention ordinary soldiers.

Unhidden Purpose

This facility would have been used as the main command point of the then JNA (Yugoslav National Army) and the Territorial Defense, as well as of the supreme commander, Josip Broz Tito.



Given the depth of the facility and the thick layers of concrete it would be able to resist direct attacks of the most powerful nuclear missiles. None of the lives of the people we have mentioned would have been endangered.
The shelter was earmarked for Tito and was located in the immediate vicinity of his residence in Tolstojeva Street, but he never came by to visit it.
According to certain claims, Slobodan Milosevic was not aware of the details of this secret, either, although the shelter was practically under his nose. We may conclude from this that he, the same as Tito, never came to visit it.

There are also those who believe such a facility is actually a symbol of how far human folly can go.
If we were to accept this reasoning, then the state could open this shelter for the public. Perhaps it will create a veritable tourist attraction. A Skadarlija underneath Dedinje.

Used Only Once

It was written, but hidden from the public, that the shelter was used only once. This happened in mid-March 1991, when the famous session of the former SFRJ's (Socialist Federal Republic of Yugoslavia) Presidency was held. The meeting was chaired by Borisav Jovic. But not even the Presidency members entered the premises, as the session was held in the so-called above-ground section of the shelter.
This was the first and the only session of the then Supreme Command that was held in the shelter. Its participants -- Stjepan Mesic, Janez Drnovsek, Vasil Tupurkovski, Bogic Bogicevic, Branko Kostic, and others -- did not actually know exactly where they were.

Part of the public that watched the documentary footage of this historic session remembers that all the jackets of the leaders present were buttoned up and that they were wearing special extra-thick military jackets.

They were cold because the venue for the session had been changed at the last minute. There simply was not enough time to properly heat the above-ground section, even with the strongest electrical heaters.

(Description of Source: Belgrade Vecernje Novosti in Serbian -- high-circulation tabloid) (FBIS Translated Text)

Germany 2004

The protected entrance tunnel to the Falkenhagen bunker was constructed from a former railway tunnel

During our first visit to East Germany in 2001 it was quickly apparent that the country was literally littered with bunkers of every size and type serving a multitude of different agencies. A large number of bunkers were built during WW2 but during the Cold War there was a new sense of urgency with a genuine belief that the country would be attacked by the 'West', this led to a new and unstoppable demand for protected accommodation for everyone in 'command' at whatever level. There were bunkers for the East German army, bunkers for the Soviet forces that were stationed in the country, bunkers for the East German government and for the Stasi, the East German secret police. Many of the WW2 bunkers were rebuilt and extended but many new bunker sites were also selected. This bunker mentality carried on unabated until the end of the cold war and just as in Britain, many of the later bunkers that were under construction as the cold war drew to a close were never completed or commissioned.

Today, the majority of bunkers in West Germany are sealed and no longer accessible but in the east it's a different story; there is less money and high unemployment. Initially many of the bunkers and their associated military complexes were taken over by the German Army (Bundeswehr) but the majority of them were soon declared surplus to requirements and abandoned. Some have found new commercial users, some have been developed as museums but a large majority have just been forgotten and are left open to the elements and the bunker hunters. One such site is Falkenhagen which although still in the hands of the German Property Services Agency is in reality derelict and gradually returning to nature. With the impending sale of the site our mission this year was to record the bunker and the surrounding surface buildings before the new owners move in. We did visit Falkenhagen in 2001 but, considering the size of the complex, the tour was short with little time to take more than a cursory look at the site. This year we planned to spend two days at Falkenhagen and a further two days looking at new (to us) sites around Berlin.

As usual the visit was co-ordinated by Mike Barton, one of our most active members living in Germany, Mike was able to arrange 'official' access to the sites and it was nice to have a key to the front gate at Falkenhagen so we were able to drive right into the centre of the complex hidden deep in woodland.

The Falkenhagen complex lies between Berlin and the Polish border and has a history going back to before WW2. Under German management, it was to comprise of two separate production facilities, only one of which was subsequently used by the Russians. This location was chosen, amongst other reasons, due to its reasonable proximity to the Wehrmacht's experimental site and laboratories in Kummersdorf, close to Wünsdorf and lying some 45 km south of Berlin (small quantities of the incendiary agent - see below - were produced initially in Kummersdorf).

This site was originally designed at the end of 1938 with construction following in mid-1939, under the auspices of the Army's Armaments Office (Heereswaffenamt) as a military factory. The production facility itself was the bunker complex as we know it and was used for the production of an incendiary agent, chlorine tri-fluoride (ClF_3), which the Germans codenamed 'N-Stoff'.

Somewhat nasty, 'N-Stoff' was of interest to the Wehrmacht as it was an extremely effective

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incendiary agent and when contained in iron vessels, it formed a passivating layer on the inner side of the container and could thus be stored. This also meant, of course, that it could be 'stored' in artillery shells and bombs. In contact with materials other than iron, chlorine tri-fluoride causes burns and generates flames, thus making it 'ideal' for use against pillboxes or personnel in protective clothing. It is also lethal if inhaled. It was initially planned to use it against filter units, for instance on the Maginot Line, where trials were carried out. The levels of carbon monoxide generated in the trials were far above lethal levels. The excessive heat set free would also have resulted in the individual bunkers being put out of action. Trials were also carried out on the West Wall. Conventional artillery fire and bombs were ineffective. When combined with flame-throwers, chlorine tri-fluoride resulted in temperatures in excess of 2400 °C.

Falkenhagen - Fuel storage tanks within the bunker span three floors

Chlorine tri-fluoride was discovered by Ruff & Krug in 1930. The compound is remarkable for the extraordinary vigour with which it reacts. It destroys glass and quartz except at low temperature; glass wool catches fire in the vapour immediately. Organic substances react at once with inflammation, one drop of the liquid sets fire to paper, cloth or wood. Most elements are attacked explosively and if not they can be ignited by a fragment of charcoal.

Fluorine for the manufacturing process was generated on site by electrolysis of a molten metallic fluoride derived from the common mineral fluorspar brought from Bavaria in Southern Germany.

Trials were also carried out to produce a torpedo driven by chlorine tri-fluoride, which would have left no tell-tale wake in the water.

This part of Falkenhagen continued to be extended until February 1943 at a total cost of 100 million Reich marks and was known as 'Muna Ost' (Munitions Plant East). This plant was operated under the control of the Waffen-SS. The original works area was 3176 hectares in size and had road and rail links. Initially the rail links were narrow gauge but eventually a standard gauge connection was made to the main Frankfurt/Oder - Berlin line.

At the centre of the complex was a huge four level bunker that was used as the production and storage facility for N-Stoff; the fourth floor being some 15 metres below ground level. The total bunkered area of the four floors is some 15,600 square metres. The bunker is about 27 metres high and has three large towers located above the bunkered area to serve as air intakes or exhausts for personnel and plant. The towers served other purposes when the bunker was being planned originally, i.e. gas washing for chlorine,

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Falkenhagen - Level 3, above the chambers there are four lines of pressure relief valves from where the water would be released into the cells below.

emergency air, etc. The Russians were therefore obliged to modify the inside of the towers to suit their purposes (filter systems).

The four floors differ in plan: Level 1 has a 189 metre long railway tunnel running along, but forming part of its south side, Levels 3 and 4 extend to the west of the higher levels (80 x 30m) and served originally for storage and emergency flooding purposes. The main core running downwards through the bunker is some 40 x 55m.

A separate 90 metre tunnel leads out from the west side of the bunker at Levels 3 and 4 to a water tower to the west of the three towers located over the bunker itself which would have provided a further source of emergency water supply. This tunnel was blocked off by the Russians, who built an additional technicians' access and emergency exit into the side of the 90m tunnel. This was tiled, acid-resistant and served as an air exhaust from the production facilities: it could have been flushed with water. Level 3 housed, amongst other things, the four chambers, where some 900 cubic metres of water were stored.

There was rail access through Level 1 of the bunker with the two tunnel entrances disguised by camouflaged corrugated iron sheds. 64 storage cells were located on Level 4 (4 lines of 16), each of these would have housed an iron container weighing 2.5 tonnes and containing 1 ton of chlorine tri-fluoride. An overhead monorail system was used for moving the containers around Level 4 and they were raised up to the upper rail level by lift. In view of the highly incendiary nature of this product, extensive measures were taken to ensure that the production and storage facilities could be flooded in the event of an accident. There is a small aperture in one corner of the ceiling in each cell to provide entry for the water and escape for fumes. On Level 3, above the chambers there are four lines of pressure relief valves from where the water would be released into the cells below.

Fortunately, production never really got underway until the autumn of 1944 with the result that only some 30 - 50 tonnes of chlorine tri-fluoride were produced by the time the Russians arrived, although the planned production figures were for 50 tonnes a month, rising to 90 tonnes. The actual production costs were some 100 Reich marks/kg.

A second facility was developed from mid-1943 in the eastern part of the site as the Sarin II Complex, a chemical agent plant that was built on the suggestion of Reichsminister Speer. This eastern part of Falkenhagen was operated by I.G. Farben, the largest chemical manufacturing enterprise in the world, which led to a conflict of interests with the Waffen-SS. As a result, the Waffen-SS retained control over Sarin production.

The Sarin 2 production plant was only 70 – 80% completed (some of the unfinished buildings are still

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standing as they were outside of the Russian restricted area and, therefore, not required): consequently, Sarin was never produced in Falkenhagen. The nerve gas Sarin was developed by I.G. Farben at Elberfeld in 1937/38. Its name came from the four scientists involved – Schrader, Ambros, Ritter and Linde - and was designed to make up for the production deficiencies of the nerve gas Tabun, Sarin being some six times more effective than Tabun (both Tabun & Sarin were originally developed as pesticides). The Sarin production technology was subsequently improved at the plant in Spandau, Berlin

64 storage cells were located on Level 4 (4 lines of 16), each of these would have housed an iron container weighing 2.5 tonnes and containing 1 ton of chlorine tri-fluoride.

As the Russians approached the German borders, a Führer Command was issued in February 1945, stating that no combat agents or munitions filled with such agents were to fall into the hands of the Russians and relevant documents were to be destroyed. Numerous special trains transported the 'products' from Falkenhagen and Kummersdorf to Stulln in Bavaria.

From the end of February – mid April 1945, Falkenhagen was used briefly as a regimental command post (CP) with a medical post being established in the tiled area of the bunker, used later by the Russians as a decontamination area. From 14 - 18 April 1945, elements of the SS Division Gross Deutschland prepared to defend the site, but left before the Russians arrived. The Red Army occupied the site in April 1945 and it served briefly as a sanatorium for the local Russian military forces. They also made use of the former storage facilities at Level 4 in the bunker (the 'cells' later used by liaison officers from the Warsaw Pact as offices) for employing German PoW's to fill artillery shells; several explosions occurred. In accordance with the Potsdam Agreement, the Russians dismantled the bulk of the former production equipment in the bunker and transported it, together with the works railway system, to Russia as reparations, without apparently knowing the true purpose of the facility at this time. Most of the WW2 buildings were either destroyed by the Russians or allowed to fall into decay. Some were taken over to suit their own purposes.

The tiled area on the top floor of the bunker (later used by the Russians as the airlock system) was used for a short time as a field hospital by the Red Army. No precise details are available on what was removed from the bunker complex by the Russians. One eye-witness stated that they removed several large compressors from the lower levels of the bunker. Evidently, some of the explosive material was still stored on the bottom level (64 storage rooms) and some explosions (and injuries) occurred as the material was being transferred for removal.

Dismantling of the production facilities and rail track took place between 1948 and 1954 and during that period it was used as a vehicle maintenance workshop. The heating plant, drinking water system and the sewage plant were evidently still functioning. From 1955 - 1959 it apparently served as a quarantine station for the Frankfurt (Oder) and Fürstenwalde area and it was not until the early 60s that they started a substantial rebuild and conversion there, lasting into the 70s, to establish the normal buildings which military units require. During this period they deliberately avoided using parts of the Sarin production area, having discovered in the intervening years what the Germans had intended to build there, other areas were either demolished or converted to more practical purposes: coal storage, etc.

The outside buildings were converted to normal military usage: accommodation, offices, medical centre, fire station, etc. The Russians were able to continue using the wells for their water supply.

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Falkenhagen - The other end of the rail tunnel and one of the emergency exits to the bunker

At first, the locals were tolerated as they made their way through the complex to nearby villages or to collect firewood; even visits to the unit cinema were allowed.

However, from 1961, Germans were no longer allowed access to the property (at other Soviet military locations in East Germany, local workforces were employed). This also restricted the amount of eye-witness reporting compared with other locations. A nearby GDR research centre endeavoured to establish contact with the Russians (common at the time), but were told to enquire in Wünsdorf. The site was described as being a technical service point, but the main construction work at this time was undoubtedly directed at converting the production bunker into a major command post for the Warsaw Pact, eastern Europe's equivalent of NATO.

The complex was so secret that even the chief signals officer of the East German army, General Paduch, had to arrive at a rendezvous at night and was then taken by car on a one-hour drive until they arrived at the bunker, where he was only allowed to see the communications centre for the purpose of the visit before being escorted out for the return journey.

Nothing has been officially published or revealed by Russian/Soviet sources on the role of Falkenhagen, but the command post was probably a forward CP, serving the general staff of the Soviet Union's armed forces on the Western Theatre. It should be noted that the Warsaw Pact would have ceased to exist as a military level in the event of war breaking out, i.e. control was in Russia's hands.

There was a slight lull in building after the initial wave, but further construction work took place throughout the 80's when the Soviets modified parts of the bunker complex and added numerous buildings to the garrison, particularly in the 70s and early 80s. Level one housed a UESO (Russian abbreviation for the special bunker servicing unit) with a dormitory in the corridor and in an area above the ceiling. On this level there was also an air detector room, 4 transformer rooms close to the south entrance, water storage tanks, sewage disposal, diesel tanks, compressors and compressed air plant. On Level 2 there were numerous offices, a safe, battle management centre, senior officers' bathrooms and toilets, ventilation, computer centre and offices for deputies. Level 3 housed a communications centre and the standby generators were located on Level 4, where the 64 WW2 chemical storage rooms were converted into offices.

From 1990 - 1992 the machine went into reverse and the facilities and equipment were gradually run down and shipped out to Russia. Falkenhagen Garrison (Military Community No. 1) was handed over by a representative of the West Group (the Soviet/Russian forces in East Germany) to the German authorities at the end of September 1992 and is currently in the hands of the German PSA and is awaiting disposal.

Interestingly, the last commandant of the site 'revealed' to the press at the handover that the complex had served as a design and test centre for communications equipment (telephones and radios). For this, they had used the four bunker levels. The workshops had only been used for repair purposes. It was rumoured at the time that the Russian press (Pravda) also revealed that Russian pigs had recently been taking flying lessons

Most of the surface buildings at Falkenhagen are open, windowless and easily accessible. Most of the buildings are Russian with their characteristic brick work with one brick laid directly on top of the next; it is surprising some of the large barrack blocks haven't fallen down. Inside the blocks there are elaborate murals in many of the rooms. A standard gauge railway line still runs along the cobbled road running through the centre of the site on one site there is a huge rail transfer shed and on the other an equally large workshop with a gymnasium alongside. The workshop with its large overhead crane still intact has a an upper gallery at one end overlooking the shop floor and at the other end steps lead up to a wood-panelled sauna with a plunge pool in an adjacent

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room. The gymnasium has a full sized basketball court, again with impressive murals on the lower level, with further exercise rooms with wall bars on the upper floor.

There are several heating plants within the complex with much of their kit including boilers and water tanks still in place and overlooking the site is an electricity sub station complete with transformers and a fully kitted out control room.

A low hill rises above the complex covering the bunker itself. There are four access points into the bunker: the main access being from either end of the railway tunnel that runs right through the hill. There is a third (main technicians') access from a surface building and a secondary technicians' access and emergency exit via a tunnel and spiral staircase located on top of the hill alongside one of the ventilation shafts.

The bunker has been largely stripped of all original fixtures and fittings although the main blast doors are still intact as are the large number of smaller gas doors passing through the tiled decontamination areas at both ends of Level 1. Perhaps the most impressive feature still remaining are the three huge diesel tanks spanning three floors and the 64 pressure relief valves in four lines of 16 on Level 3. These would have allowed water to flood the storage cells on Level 4 in the event of an accident.

After two days at Falkenhagen it was time to move on but we didn't have to travel far. There is a second military complex close to Falkenhagen which was the site was an outstation of the 'VEB Physics Workshops' in Berlin-Rahnsdorf (south-east area of Berlin). This was set up in 1959 after it had become clear to the East German authorities that scientists in the USA, the USSR and the UK had commenced top-secret research in the early 50's into problems of a controlled thermonuclear reaction. It was apparent that a high-temperature plasma of some 100 million°K would be needed to create the fusion of the light cores (hydrogen isotopes of deuterium or tritium) and the heavy cores (helium isotopes).

In order to keep abreast of theoretical and technological developments elsewhere, it was decided in 1957/58 to establish the institute in Rahnsdorf to look into the associated problems. The institute (Institut für Halbleiterphysik [IHP]- Institute for Semiconductor Physics) was assigned to the East German Ministry of Defence for security reasons and described as being the 'VEB Physics Workshops' (VEB = state-owned facility). However, it soon became apparent that more space was needed for experiments in the field of high-temperature plasma physics, located ideally underground and in a lightly inhabited area. Such a site was offered by the former armaments facility of the Third Reich on the east bank of the Schwarzer See (Black Lake) just to the east of Falkenhagen. Due to its ferro-concrete construction, this facility provided a natural Faraday cage, i.e. it provided an electrical screen, thus enabling the plasma experiments to be carried out without any electrical interference from outside.

The facility provided a production hall some 400 m² in size and 8 m high. The other levels were 3.7 m high, intermediate floors some 1.8 m high. These levels were divided into rooms or served to provide the normal services (water, electricity, HVAC).

The bunker here is located at the rear of the administration complex and is set into a hillside overlooking a lake. We entered through the emergency exit close to lake level and climbed up to the vast production hall in the centre of the bunker.

IHP Schwarzer See - production hall some 400 m² in size and 8 m high.

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Alt Rehse - series of buildings resembling farm houses in the local style

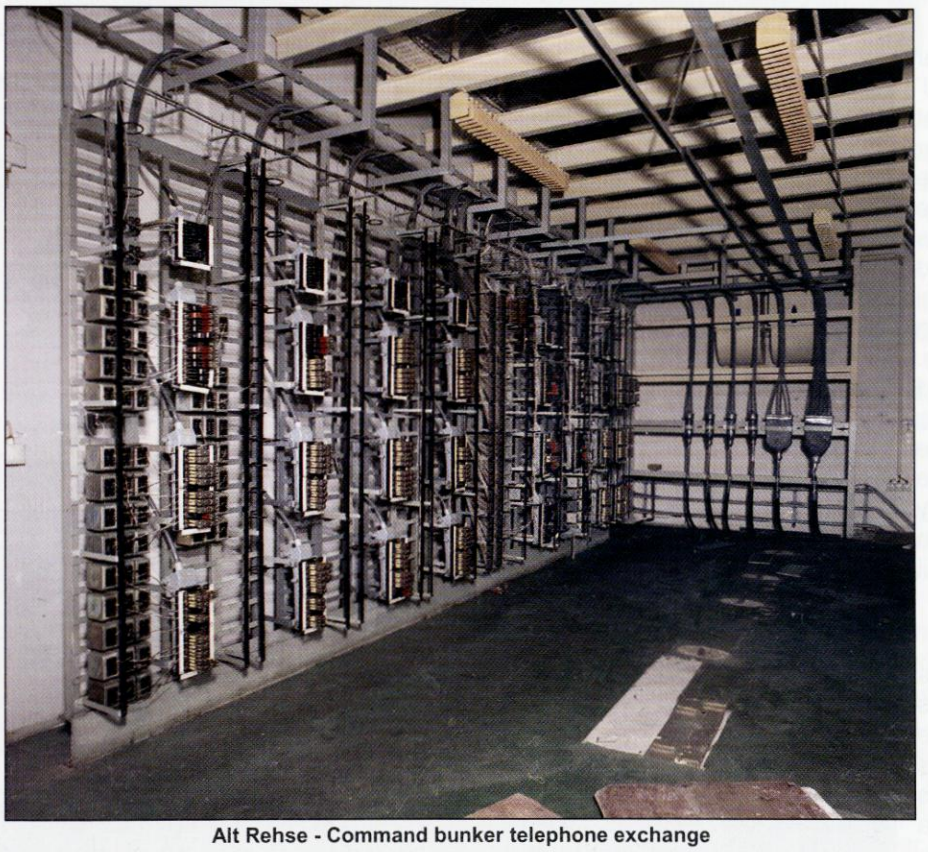
On day 3 our destination was Alt Rehse. The 65 hectare medical training centre at Alt Rehse was opened in June 1935, an event that was broadcast live on the radio. In contrast to numerous other Nazi concrete monstrosities, the plans for the complex in Alt Rehse (Mecklenburg) envisaged a series of buildings resembling farm houses in the local style. This may well have upset the artistic streak in Hitler as he was somewhat annoyed when told of the plans at a late stage in their development. As a result, he never visited the centre.

The school was intended to become the medical centre within the Third Reich where doctors, midwives, chemists and health officials would be taught the party line with regard to racial politics, eugenics , 'racial hygiene' and euthanasia, which would in turn lead to the legally prescribed sterilisation and death of those unfortunates who fell within the clutches of the race laws and to the thousands of 'patients' who were experimented on and killed in the numerous sanatoria scattered throughout the Third Reich.

Doctors considered how many patients could be annihilated in an hour, or planned how to gas the physically disabled or discussed the trials to be carried out in the concentration camps. One of the doctors, Alois Boehm, actually gave up his own disabled son to be subsequently killed.

The site was guarded by members of the SS, and signs of the previous occupiers can still be found: swastikas carved into the gatehouse and the construction date '4 years', i.e. the fourth year after the seizure of power by the Nazis, in a beam of one of the farmhouses. The motto of the medical centre - My honour is loyalty - is concealed by a porch dating from GDR times.

Although largely stripped of all original fittings there are a number of electrical cabinets still in place and the room is lit by two windows high up on one wall opening onto the hillside. The bunker itself is on at least five levels (with other sub levels) with a lift still in place linking each level.



Alt Rehse - Command bunker telephone exchange

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Alt Rehse served various purposes in the years after WW2, at the very end even as a rest home for East German military officers.
From 1978 - 1982 construction took place within the original site to build the northern equivalent of the multi-bunker complex at Söllichau, NE of Leipzig, which Sub Brit visited in 2001.
From the German point of view, the German Democratic Republic (GDR) was divided into two military commands: Military District V in the northern half of the country and Military District III in the south. MD III served the 3rd Army and was based on Leipzig. In the event of mobilisation, a further army would have been formed, the 13th , headquartered on Söllichau.
In the north, the situation was similar: the 5th Army, based on Neubrandenburg, with the mobilisation army being the 15th, headquartered at Alt Rehse.
For this purpose a large prefabricated bunker was constructed to the south of the medical training centre. This consisted of four small staff bunkers and the main command bunker built of prefabricated 'U' shaped concrete arches that were earthed over. The bunker is roughly 'H' shaped with the main communications centre in the crossbar of the 'H'. This crossbar is also extended north and south making a total of six large chambers radiating from the command centre. Each of these chambers would have accommodated three signals trucks with satellite dishes on their roofs: these would have been permanently 'plugged in' to the main communications facilities until required for action in the field.

Each of these chambers has two heavy steel blast doors and at the back of the chamber smaller gas doors into the communications centre which consists of a single spine corridor along one side giving access to a number of rooms. One of these rooms still contains the main distribution frame and other electrical switchgear, another contains gas filters and a large fan. Toilets, showers and three ventilation plant rooms are located on an upper level where there is also an emergency exit.
The bunker is located in an inner compound within the Alt Rehse complex. Just outside this compound is one of the houses built during WW2. The

'Bunker 5005' - Office block above bunker complex

'Bunker 5005' - Dispatcher room the control centre for the bunker

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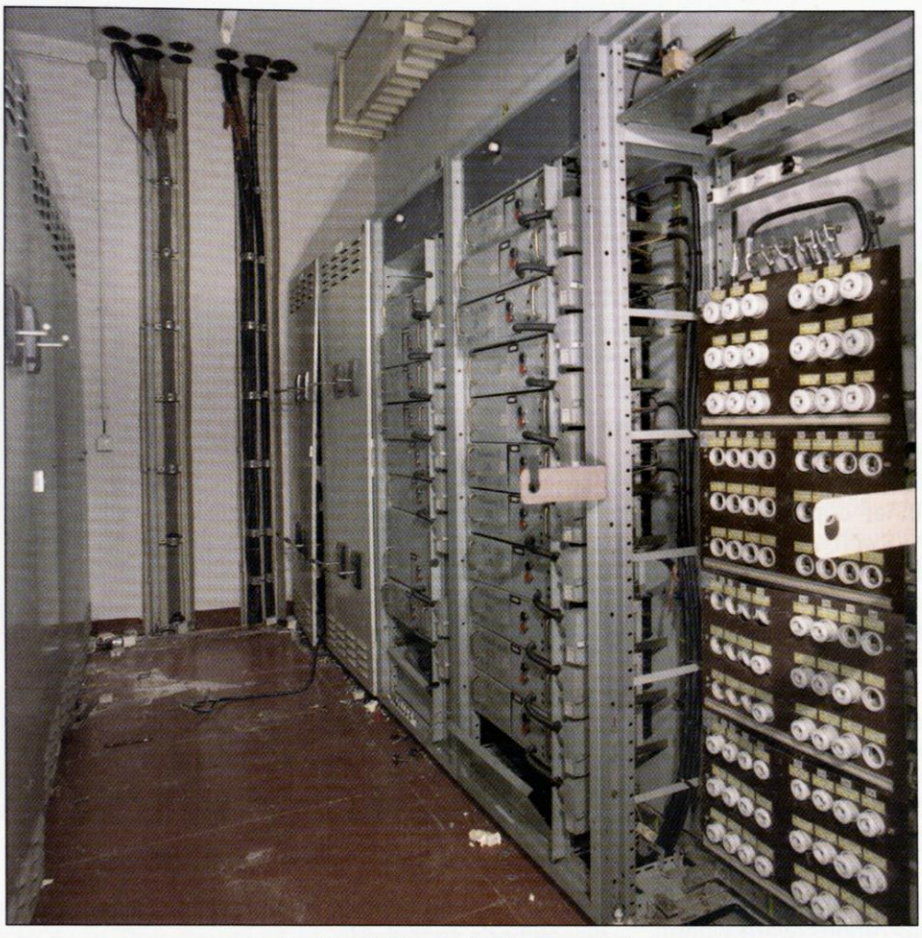

'Bunker 5005' - Power distribution plant room

basement of the house is 'bunkered' with blast doors into each of the rooms some of which still contain electrical switch gear. One of these doors gives access to a tunnel which runs under the fence into the inner compound. Half way along this tunnel there is a small personnel shelter on one side with its own ventilation plant. Other personnel shelters can be found scattered around the grounds.

The complex at Alt Rehse has been empty for some years but the site is secure with an internal low voltage electric fence and the site is well maintained. It is currently used as an occasional meeting place-cum-exhibition which documents this aspect of Germany's and the medical profession's history. It is hoped to develop this as a tourist attraction although the bunker will probably not be included as part of the tour.

Our final destination on Day 4 was to 'Bunker 5005' at Biesenthal. The 5000 series of bunkers were built by the East German Government in the latter years of the cold war and employed all the latest technological advances. Last year we visited 5001 at Prenden which is a three-level suspended bunker for Erich Honecker, the East German leader. 5005 was built as a central command centre for the Stasi, the East German secret police

The bunker is located on the road linking Biesenthal and Sophienstädt, some 33 km to the NE of Berlin. The NW limits of the restricted area lies alongside the A11 autobahn (Berlin - Stettin).

The bunker is located inside a secure 20 hectares inner compound inside the main 293 hectares administration and domestic complex. The bunker has two storeys and cost, together with auxiliary facilities, some 100 million marks. It was not the largest bunker in the East German collection, but was technically the most advanced one.

It was designed to accommodate 160 personnel and could withstand a shock wave of 5 kp/cm². Further, it was resistant to a vertical acceleration of 4g, a horizontal acceleration of 2g, and was NBC-resistant.

Problems during construction (holes in the walls between rooms for cables and pipes were forgotten) meant that these had to be subsequently made manually. It was completed at the end of 1988 after the various construction problems had delayed intermediate acceptance dates. Due to historical events leading to the end of the Cold War, the bunker was never officially brought into service.

The security fence and the four-storey 'accommodation building' can be seen from the road, along with various other buildings in the complex. The inner compound ('Parkzone' in German) with the actual bunker is 6 hectares in size and is located on the east side and has its own high-voltage security fence. Due to its oversensitivity and the fact that it was not divided into separate isolated sections, the high voltage fence was frequently out of action.

A normal military assault course was what the casual observer would have seen on the raised ground within this secured area, plus a large 4-storey building together with two smaller buildings. Parts of the assault course conceal the emergency exit from the bunker. The 'accommodation block' was the surface HQ building. Its cellar, under a very thick ceiling, formed an area which could be rapidly turned into further protected working areas and is the access point to the tunnel leading to the bunker proper. The tunnel passes under the equipment building on the surface, which provided an access point for lowering equipment into the bunker complex, which lies under

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the raised ground.
The bunker is of monolithic construction with the most important areas being located at its centre: the outer ring of offices and rooms could therefore have served as a crunch zone to protect the inner area. The entrance area housed the normal decontamination facilities and rubbish chutes for contaminated outer clothing, with the whole section here being under the visual control of the airlock commandant. A second decontamination section provided further showers and additional chutes for other clothing. Personnel entering the complex in times of crisis would have been issued with completely new sets of clothing.
The upper level of the bunker was set aside for staff and accommodation areas. These were located around a ring corridor. The inner core at this level included the situation room with a map wall, armchairs and a control desk. The room is on two levels; the maps would have been marked up in a neighbouring room and then moved in on rails. Erich Mielke, the last head of the Stasi, had his working and living quarters adjacent to the situation room. These are reasonably basic and functional. Evidently, however, his subordinates had wanted to impress him and had initially aimed to provide a far more impressive arrangement. Following internal complaints along the lines of increased costs without an increase in efficiency (an estimated additional 3 million marks to bring it up to international hotel standards), reports and counter-reports were written. It was claimed that the additional fineries (wood panelling, carpets, wooden floors, fashionable furnishings) were a fire hazard and that "we had cut back costs for the construction of missile facilities, but were throwing money out of the window for the interiors of bunker complexes". Russian experts were also quoted who had criticised the level of such fineries, which added nothing to the functionality of the bunker. Other rooms demonstrate the normal spartan approach.
The lower level houses the services section and dispatcher (control) room in the centre. The standby generators were located directly under the main entrance in the upper level; here three marine diesels, each 400 kVA, would have powered the complex. This level also contains wells, water conditioning plant and food store, computers, communications and the main distribution frame.
All the blast doors, decontaminations areas, ventilation plant, filtration plant and water purification plant are still in place and are in good condition. The three marine diesels have been removed and the computer and frame rooms are in poor condition. The main distribution frames are still in place although most of the wiring has been stripped out. In the communications rooms racks of equipment litter the floor and the main (plant) control room for the bunker has been ransacked and although largely intact is a

'Bunker 5005' - high-voltage security fence.

mess with some fire damage to one of the dispatcher's consoles.
The upper domestic rooms are largely empty although there is some furniture in the situation room and Erich Mielke's personal toilet is still intact with its brown glazed tiles! Both levels have several dormitories with bunk beds suspended from the ceiling.
Most of the surface buildings are still standing within the main compound and within the inner secure compound but the site is in the process of being completely cleared.

Sources:

Mike Barton - Paul Sowan - Paul Bergner- Heini Hoffmann

History of 5005 translated from '*Befehl Filigran*' by kind permission of the author Paul Bergner

www.ddr-bunker.de

The translated history of Falkenhagen was taken, with permission, from '*Objekt Seewerk*' by Dr. H. Hofmann (ISBN 3-930588-66-8). This book is in German. Dr. Hoffmann headed the IHP facility at Falkenhagen and acted as out guide in 2001.

Those present from Sub Brit were Mike Barton, Nick Catford, Dan McKenzie, Robin Ware, Mark Bennett & Jane MacGregor

From Nick Catford

The threat from within to cold war bunkers

The great variety of cold war defences in the UK thankfully were never used for their intended purpose, following the end of the cold war many military command facilities continued in use as they were key integral elements of the air defence of the UK.

However the development of pinpoint accuracy bunker busting bombs means that our underground and protected facilities are now totally vulnerable.

Many of our underground structures are shallow, the Air Defence Centre at RAF Neatishead for example is only 40ft below ground and particularly vulnerable; our bunkers cannot compare with the incredible construction of American facilities like Cheyenne Mountain.

By the end of 2005, the only operative military bunkers in the UK will be:

1) Northwood NATO Joint HQ

2) High Wycombe UK Air Defence Operations Hub – this was only built in 1984

3) The Air Defence Operations Centre at Bentley Priory (likely to close)

4) RAF Boulmer – recently re-engineered to become the main radar control facility for the UK. Even this will close in 2008 replaced by an unprotected air defence centre at RAF Scampton.

Recent closures have included the two maritime HQ's at Portsmouth (Fort Southwick) and Plymouth (Mount Wise) replaced by surface communications centres.

2 major radar stations RAF Buchan and RAF Neatishead have been reduced to remote radar sites with minimum staffing.

On the civil front, the new fight against terrorism following 9/11 has seen development of good quality emergency centres and communications systems but these are now located in office suites. There is no longer a requirement for bunkers and in any case staff are reluctant to work in dingy basements.

So 13 years after the official end of the cold war and disbanding of the ROC what has happened to all those local authority controls, ROC group headquarters and other military facilities?

In the early 90's the government was happy to shed its property at rock bottom prices just to get rid of them, even after some had been recently refurbished at vast cost.

Many people who brought these sites have been lumbered with white elephants, bearing in mind the huge running costs. Many were to become secure archive stores but it's far cheaper to maintain a highly secure surface warehouse as many found out. Some owners have just let their properties sit and rot, thinking they could sell them later and make a profit (i.e. the ROC group HQ Exeter).

We had 4 excellent museums set up, that at Mistley closed recently but not for lack of visitors.

English Heritage was very slow to take an interest in cold war sites but eventually has listed several sites, indeed it has spent £350,000 on York ROC Group HQ, but by the time it took interest many bunkers had gone.

The biggest threat to cold war infrastructure has been the house building boom of recent years fuelled by new government targets for house building putting pressure on local councils to perform. At the same time as these cold war sites were available, the NHS had virtually finished its programme of closing down the vast mental asylum complexes, and therefore many of these sites were snapped up by developers with existing buildings available for conversion. However by 2001 most of these sites were accounted for and a fresh impetus was made to acquire old military and civil sites.

Some bunkers are on sites of high land value; RSG 4 at Cambridge is close to the heart of the city and developers have tried three times to demolish this listed building.

There are some excellent developers who will work with councils and residents to utilise existing buildings and keep features, but sadly this isn't always the case. Even small plots have been transformed into high density developments, for example the London Group HQ at Sutton the site of which became an apartment block.

Rural sites are not safe either, in northern Scotland the old fighter sector ops block near Peterhead was demolished to build a house,

The only way forward is to develop a liaison between interested parties so local planning meetings can be attended and more importantly planning applications can be found out about before they are passed without objection.

The future is looking bleak for our cold war heritage as many sites are being sold at vastly inflated prices. The worst affected set of buildings has undoubtedly been those of the ROC. Since 2001 many group HQs have been demolished, mostly for housing.

Many of these buildings had a fortune spent on them in 1990 to upgrade them, a programme that was still progressing when ROC stood down! The most recent victim being Horsham group HQ demolished for sheltered housing.

The next no doubt will be Exeter where the owner has left the building open to vandals -in 2001 it was in good condition. The reasoning behind this is unclear, but a defence estates officer told me his experience was that odd sort of people tended to buy the bunkers!

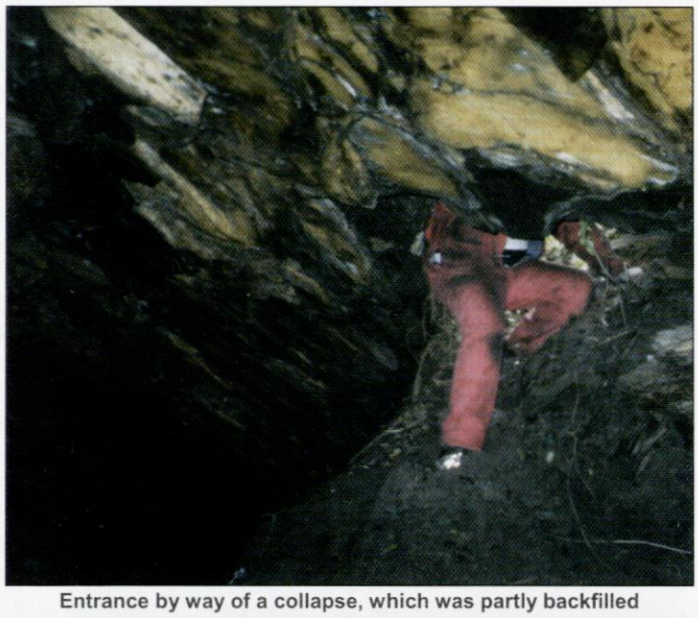
So we leave this in November 2004 with news just in that the world famous RAF Uxbridge is to close by 2008 so what will become of the AAOR and the historic 11 Group Ops Room?

By Keith Ward

Whitequarries Oil Shale Mine, Abercorn, Lothian

Some of the following is sourced from the Grampian Speleological Group information which was provided on the Study weekend, and thanks to Paul Sowan for supplying further information.

This year's Study Weekend could almost be called extreme, with a speedboat trip to Inchkeith Island despite borderline weather on Day 2. On Day 1 one of the options for the final trip of the day was into one of the last remaining accessible parts of Whitequarries Shale Mine. I'm not too sure it wasn't getting close to my final trip of all... more on that later. The whole weekend was fantastic, and thanks to all involved on the organization side for a superb job.



Entrance by way of a collapse, which was partly backfilled

Whitequarries Mine was opened around 1900 by a private company called James Ross & Co. In the 1920s they were processing around 850 tons of shale per day. However, by then crude oil was the preferred source of petrochemicals, requiring much less processing and refining. Whitequarries was partially subsidised by a duty preference, but in 1962 this was removed and the mine closed; it is estimated that 75 million tons of workable shale remain here and in other sites. The system extends under the Firth of Forth and most of the workings have flooded.

The mine consists of horizontal galleries, linked by tunnels leading downwards at an almost 45-degree angle. Our paperwork on the study weekend stated that there were two possible ways, one with steep slippery slopes and a risk from [carbon dioxide] gas, and one "easier going." We went for the easier route.. and encountered steep, muddy slopes and carbon dioxide gas. And it was the easier route, as I have since read what the other section is like. The first butane lighter test was inconclusive, but the second yielded a flame, so we pressed on.

Entrance was by way of a collapse, which was partly backfilled but could be wriggled into. Once inside we were in one of the highest horizontal tunnels. The shale is of a dark colour, with frequent swathes of orange and a slight sulphury smell. This was slightly reminiscent of Cae Coch, although nothing as spectacular- there are few formations.

At a couple of points further in, the atmosphere was not good and one or two people reported feeling headachy and hot, both indicators of elevated carbon dioxide (black damp) levels. We wanted to descend to the next level and so we did: the sloped tunnels are so steep that they are really at a critical angle resulting in everyone sliding, and most people taking a fall or two. The passage below is usually dry, but after our wet summer there was a lot of water. Trying to stay out of it and creep along the side was hopeless, most people got at least wet feet and at my short height I was soaked to the belay belt, but everyone took it in good part and there was much amusement.

Climbing up the next inclined tunnel, with the flood just behind us, was positively dangerous! I nearly went into the deep water and was glad I'd put my cowtail on, as it enabled another member to anchor me while I found a precarious foothold. At this point those still descending sensibly decided to stay in the upper tunnel. At the top of the slope we found a winch cable and rails going up the incline, which made the climb to the winding gear a working proposition. Everyone reported the climb being much more of an effort than it should have been, again causing us to become hot and tired, and we were fairly sure that this was the bad air again. There is a winch emplaced in bricks at the top, and an upside-down wagon. Also a great view straight down into the water.

By now time was short, so we retraced our steps. Emerging from the hole, we were all muddy, most of us wet, and one person had gone in without overalls and had to be issued with one of the anti-asbestos suits we'd had with us for the Barnton Quarry trip. It is a shame that most of the mine is flooded, as it was obviously an extensive and very interesting site. Reading more of the Grampian Speleological notes, the cold winter seems to be the best time to visit as cold air falls into the mine and sets up convection currents, turning the air over and reducing the black damp. Special thanks to Ivan Young for leading us on a trip that couldn't have been more different to the modern Falkirk New Canal Tunnel we'd just come from. Great fun, and I would like to explore more of the site.

Jane MacGregor

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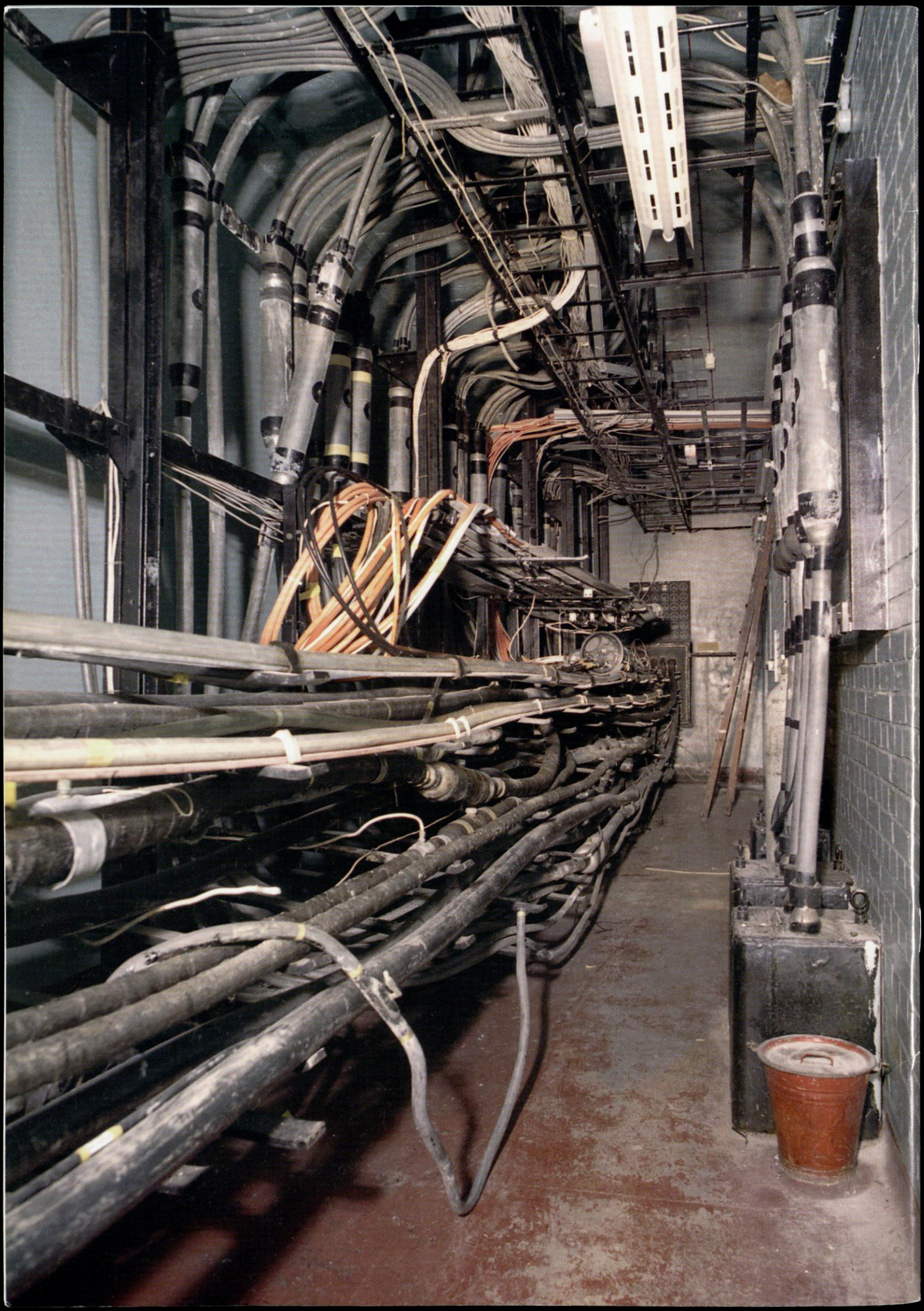
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